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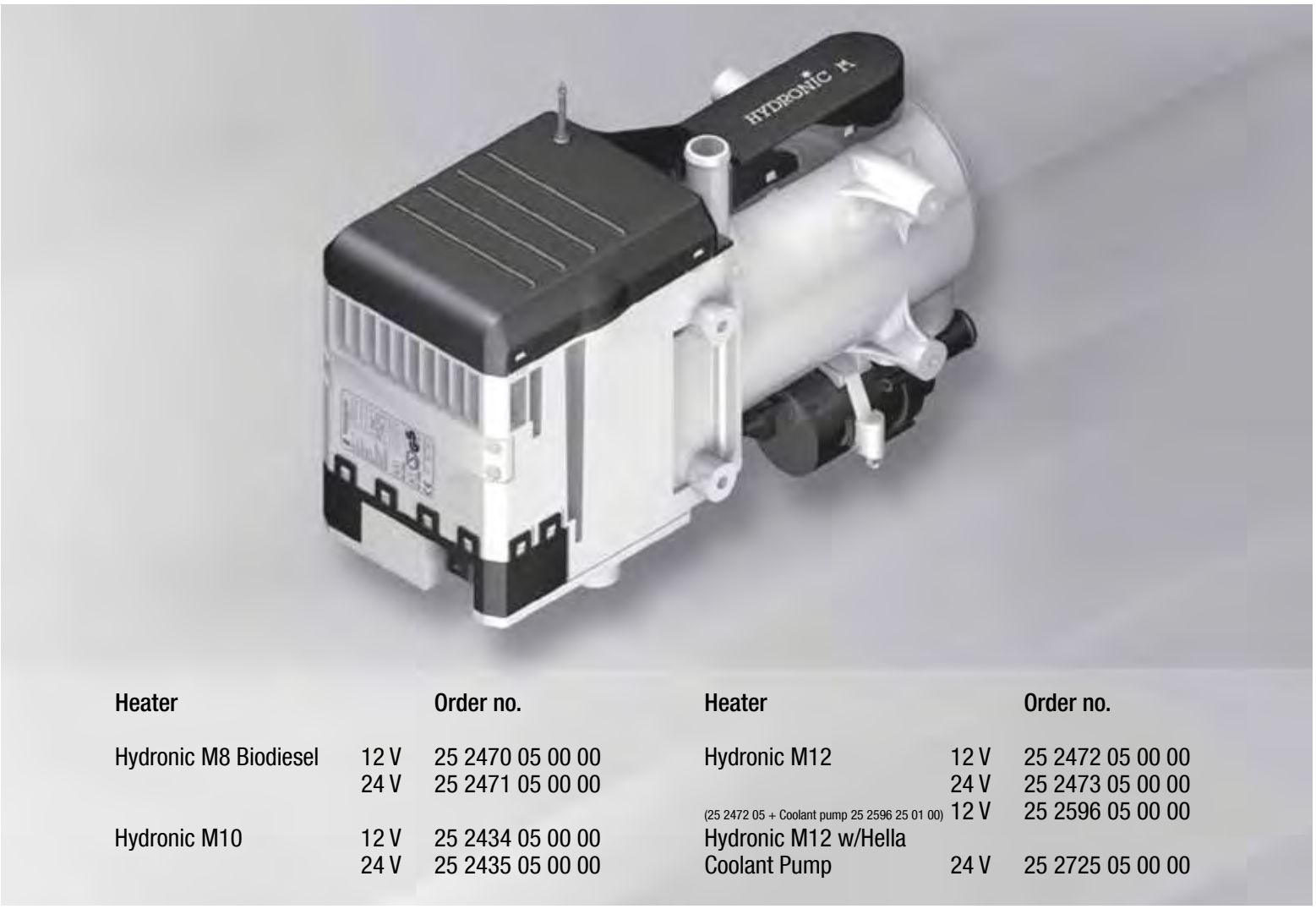
HYDRONIC M-II

Technical description, installation, operation, maintenance instructions & spare parts list



Heater		Order no.
Hydronic M8 Biodiesel	12 V	25 2470 05 00 00
	24 V	25 2471 05 00 00
Hydronic M10	12 V	25 2434 05 00 00
	24 V	25 2435 05 00 00

Heater		Order no.
Hydronic M12	12 V	25 2472 05 00 00
	24 V	25 2473 05 00 00
(25 2472 05 + Coolant pump 25 2596 25 01 00)	12 V	25 2596 05 00 00
Hydronic M12 w/Hella Coolant Pump	24 V	25 2725 05 00 00

Water heater for diesel and petrol operating independently of the engine.

Eberspächer
A world of comfort

Web Edition
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1 Introduction

CONTENTS

1 Introduction

CONCEPT OF THIS MANUAL

This manual aims to support the dealer/user during the installation, operation and repair of Hydronic M-II heaters as well as to provide the part list of the heater and accessories.
For quick and easy access, the Hydronic M-II manual is divided in to 9 chapters wherein each chapter provides information on specific topic as listed below:

1 INTRODUCTION
Here you will find important information related to warnings, caution and safety while working on the heater systems.

2 PRODUCT INFORMATION
Here you will find brief information about the heater, its technical data and dimensions.

3 INSTALLATION PROCEDURES
Here you will find important information and instructions referring to installation of the heater system.

4 OPERATION AND FUNCTION
Here you will find information about the operation and function of the heater.

5 ELECTRICAL SYSTEM
This section contains wiring diagrams for the heaters and their harnesses.

6 TROUBLESHOOTING / MAINTENANCE / REPAIRS
This section contains information on possible faults and malfunctions, troubleshooting, maintenance and the service hotline.

7 REPAIR INSTRUCTIONS
Here you will find the service parts diagrams, parts lists for the repair instructions.

8 HEATER COMPONENTS
Here you will find the heater diagrams, spare parts lists and related descriptions of heater components.

9 ENVIRONMENT
This section contains information on Certificationa and Disposal.

SPECIAL TEXT STRUCTURE, PRESENTATION AND PICTURE SYMBOLS

This manual uses special text structures and picture symbols to emphasise different contents.
Please refer to the examples below for the corresponding meanings and associated actions.

DANGER!
- Indicates that serious or fatal injury may result if specific guidelines are not followed.

CAUTION!
- Indicates that personal injury or damage to equipment may occur unless specific guidelines are followed.

WARNING!
- Indicates very important heater information that may cause personal injury, heater failures and maintenance costs.

Please note!
- Indicates general heater related notes, clarifications and recommendations, which can be very useful for technician, installer, or owner; and should not be disregarded.

(•) A dot indicates a list, which is started with heading;
(-) If indented dash follows a “dot”, this list is a sub section of the black dot;
(*) An asterisk symbol describes a further note on it’s associated title, statement or data.

FOREWORD

- This document is applicable to the heaters listed on the title page, to the exclusion of all liability claims, and aims to support registered dealers, service technicians and end users in Eberspaecher Climate Control Systems. This does not replace documentation produced by J. Eberspächer.
- The installation instructions and standards described in this document are NOT APPLICABLE TO MARINE INSTALLATIONS.
  Please consult a certified Eberspaecher Climate Control Systems Marine dealer for marine installation.
- There may be some design changes in any OEM installed Eberspaecher heater; therefore it is recommended to service the heater only at OEM approved dealer.
- This publication was correct at the time of going to print. However, Eberspaecher Climate Control Systems. has a policy of continuous improvement and reserves the right to amend any specifications without prior notice.
- Eberspaecher Climate Control Systems takes regular steps to ensure that any content, illustrations and technical data in its manuals are correct; however errors do occur, and Eberspaecher Climate Control Systems reserves right to correct any such errors, and disclaims liability resulting therefrom.
- Eberspaecher Climate Control Systems is not liable for any negligence and incompetence from dealers, installers and owners thereby causing heater or any related system failures and do reserves rights to nullify the warranty under such conditions.
- Any parametric information related to the heating system (like technical data, illustration, table, calculation, graph) in this manual is available to provide a supplementary technical guidance for installers and dealers. It does not, however, replace or supersedes any application specific rules and regulations for heating and ventilation system in automobiles.
- This documentation must be considered merely as a supplementary guideline for warranty or related matters; In such case, a user or dealer must read an official warranty documentation for further information related to recognized heater troubleshooting process and claim procedure.

Please note!
These remarks contain application recommendations and useful tips for installation of the heater.

1 Introduction

IMPORTANT INFORMATION BEFORE STARTING WORK

RANGE OF APPLICATION OF THE HEATER

The water heater operating independently of an engine is intended for installation in the following vehicles, depending on its heating output:
- Vehicles of all kinds
- Construction machinery
- Agricultural machinery
- Boats, ships and yachts

PLEASE NOTE!
- Installation of the heater is permitted in vehicles used for the transport of dangerous goods as per **ADR** (European agreement about the international transport of dangerous goods on the road)
- The heater is not approved for installation in vehicle compartments used by persons (more than 8 passenger spaces) in Class M2 and M3 vehicles (vehicles for the transport of passengers / commercial buses).
- The heater is not approved for installation in the driver or passenger compartments of Class M1 vehicles (vehicles for the transport of passengers / cars) and Class N vehicles (vehicles for the transport of goods).

On account of its functional purpose, the heater is not permitted for the following applications:
- Long-term continuous operation, e.g. for pre-heating and heating of:
  – Residential rooms
  – Garages
  – Work huts, weekend homes and hunting huts
  – Houseboats, etc.

⚠ CAUTION!
SAFETY INSTRUCTIONS FOR APPLICATION AND PROPER PURPOSE

The heater must only be used and operated for the range of application stated by the manufacturer in compliance with the "Operating Instructions" included with every heater.

STATURORY REGULATIONS

The Federal Motor Transport Authority has issued an "EC type approval", "EMC type-approval" and the approval for a component according to ECE R122 and ECE-R10 for the heater for installation in motor vehicles with the following official type-approval marks, noted on the heater name plate.

Heater type:	ECE type approval mark:
Hydronic M-II	E1 122 R – 000215 10 R – 045075

§ REGULATIONS:
EXCERPT FROM ECE REGULATION NO. 122 OF THE EUROPEAN PARLIAMENT AND THE COUNCIL

GENERAL REGULATIONS
- **Operating state display**
– A clearly visible operating display in the user's field of vision must indicate when the heater is switched on and off.

Regulations concerning installation in the vehicle
- **Scope**
– Subject to differing stipulations in the following section, combustion heaters must be installed according to the regulations 5.3 of ECE-R122.
– It is assumed that Class 0 vehicles with heaters for liquid fuel conform to the regulations 5.3 of ECE-R122.
- **Position of the heater**
– Parts of the structure and other components near the heater must be protected from excessive heat exposure and possible fuel or oil contamination.

– The heater must not pose a fire hazard even when it overheats. This requirement is deemed to be fulfilled if adequate clearance is ensured for all parts during installation, sufficient ventilation is provided and fireproof materials or heat shields are used.

– The heater must not be mounted in the passenger compartment of vehicles in class M2 and M3.
However, a heater in a hermetically sealed enclosure which also complies with the aforementioned conditions may be used.

– The factory nameplate or duplicate of it must be affixed so that it can still be easily read when the heater is installed in the vehicle.

– All appropriate precautions must be taken when arranging the heater to minimise the risk of injuries to persons or damage to other property.

- **Fuel supply**
– The fuel intake connection must not be located in the passenger compartment and must be sealed with a properly closing lid to prevent any fuel leaks.

– In heaters for liquid fuel where the heater fuel is separate from the vehicle fuel, the type of fuel and intake connection must be clearly identified.

– A warning sign is to be fixed to the intake connection indicating that the heater must be switched off before refuelling.

- **Exhaust system**
– The exhaust outlet must be arranged so as to prevent any penetration of exhaust fumes into the vehicle interior through the ventilation system, warm air intakes or open windows.

- **Combustion air intake**
– The air for the heater's combustion chamber must not be sucked in from the vehicle's passenger compartment.

– The air intake must be arranged or protected in such a way that it can not be blocked by other objects.

- **Automatic control of the heating system**
– If the engine fails, the heating system must be automatically switched off and the fuel supply stopped within 5 seconds. The heater may remain in operation if a manual device has already been activated.

PLEASE NOTE!
The heater is not approved for installation in the driver's cab or passenger compartment of Class M1 vehicles (vehicles for passenger transport / cars) and N vehicles (vehicles for the transport of goods).Components included with different kits may vary.

§ REGULATIONS:
ADDITIONAL REGULATIONS FOR CERTAIN VEHICLES NAMED IN DIRECTIVE 94/55/EC OF THE ADR (EUROPEAN AGREEMENT ABOUT THE INTERNATIONAL TRANSPORT OF DANGEROUS GOODS ON THE ROAD) AGREEMENT

Scope

This annex applies to vehicles to which the special provisions of Directive 94/55/EC of the ADR Agreement for combustion heaters and their installation apply.

Definition of terms

The vehicle designations "EX / II", "EX / III", "AT", "FL" and "OX" according to Chapter 9.1 of the ADR Agreement Directive are used for the purposes of this annex.

TECHNICAL REGULATIONS

General provisions (EX / II, EX / III, AT, FL and OX vehicles)

Avoid heating and ignition

The combustion heaters and their exhaust gas routing shall be designed, located, protected or covered so as to prevent any unacceptable risk of heating or ignition of the load. This requirement shall be considered as fulfilled if the fuel tank and the exhaust system of the appliance conform to provisions in 3.1.1.1 and 3.1.1.2.
Compliance with these regulations shall be checked in the complete vehicle.

Fuel Tanks

Fuel tanks for supplying the heater shall conform to the following regulations:
- In the event of any leakage, the fuel shall drain to the ground without coming into contact with hot parts of the vehicle or the load;
- Fuel tanks containing petrol shall be equipped with an effective flame trap at the filler opening or with a closure enabling the opening to be kept hermetically sealed.

Exhaust system and exhaust pipe layout

The exhaust system as well as the exhaust pipes shall laid out or protected to avoid any danger to the load through heating or ignition. Parts of the exhaust system situated directly below the fuel tank (diesel) shall have a clearance of at least 100 mm or be protected by a thermal shield.

Switching on the combustion heater

The combustion heater may only be switched on manually.
Automatic switching on via a programmable switch is not permitted.

EX / II and EX / III vehicles

Combustion heaters for gaseous fuels are not permitted.

F L vehicles

Combustion heaters must be able to be taken out of service/disabled at least by the methods described in the following:
a) Switching off manually in the driver's cabin
b) Switching off the vehicle's engine; in this case the heater may be manually switched back on by the vehicle driver;
c) Starting up of a feed pump installed in the vehicle for the dangerous goods carried.

Exhaust system and exhaust pipe layout

After-running of the switched off combustion heater is permitted. In the cases named in the "FL vehicles" paragraph under letters b) and c) the supply of combustion air must be interrupted by suitable means after a maximum after run period of 40 seconds. Only combustion heaters whose heat exchangers are verifiably not damaged by the reduced after-run period of 40 seconds beyond their usual use period may be used.

PLEASE NOTE!

- Compliance with the statutory regulations, the additional regulations and safety instructions is prerequisite for guarantee and liability claims. Failure to comply with the statutory regulations and safety instructions and incorrect repairs even when using original spare parts make the guarantee null and void and preclude any liability for Eberspächer Climate Control Systems GmbH & Co. Kg.

- Subsequent installation of this heater must comply with these installation instructions.

- The statutory regulations are binding and must also be observed in countries which do not have any special regulations.

- When the heater is to be installed in vehicles not subject to the German Ordinance for the Registration of Motor Vehicles (StVZO), for example ships, the specially valid regulations and installation instructions for these special applications must be observed.

- Installation of the heater in special vehicles must comply with the regulations applying to such vehicles.

- Other installation requirements are contained in the corresponding sections of this manual.

1 Introduction

IMPORTANT INFORMATION BEFORE STARTING WORK

⚠ DANGER! RISK OF INJURY, FIRE AND POISONING

- Disconnect the vehicle battery before starting any kind of work.
- Before working on the heater, switch the heater off and let all hot components cool down.
- The heater must not be operated in enclosed rooms, e.g. in the garage or multi-storey car park.

⚠ CAUTION! SAFETY INSTRUCTIONS FOR INSTALLATION AND OPERATION

- The heater must only be installed by a JE partner authorised by the manufacturer according to the instructions in this manual and possibly according to special installation recommendations; the same applies to any repairs to be carried out in the case or repairs or guarantee claims.
- Repairs by non-authorised third-parties or with not original spare parts are dangerous and therefore not allowed. They result in expiry of the type permit of the heater; consequently, when installed in motor vehicles they can cause expiry of the vehicle operating licence.
- The following measures are not allowed:
  – Changes to components relevant to the heater.
  – Use of third-party components not approved by Eberspächer Climate Control Systems GmbH & Co.Kg.
  – Nonconformities in installation or operation from the statutory regulations, safety instructions or specifications relevant to safe operation as stated in the installation instructions and operating instructions.
  This applies in particular to the electrical wiring, fuel supply, combustion air system and exhaust system.
- Only original accessories and original spare parts must be used during installation or repairs.
- Only the controls approved by Eberspächer may be used to operate the heater. The use of other controls can result in malfunctions.
- Before the heater is installed again in another vehicle, rinse the heater parts carrying water with clear water.
- When carrying out electric welding on the vehicle, the plus pole cable at the battery should be disconnected and placed at ground to protect the controller.
- Do not operate the heater anywhere where there are readily flammable materials (e.g. dry grass, leaves, paper, etc.) in the area of the exhaust system or where ignitable fumes and dust can form, e.g. near a
  – Fuel depot
  – Coal depot
  – Wood depot
  – Grain depots, etc.
- The heater must be switched off when refuelling.
- When the heater is mounted in a safety housing etc., the installation compartment of the heater is not a stowage compartment and must be kept clear.
  In particular fuel canisters, oil cans, spray cans, gas cartridges, fire extinguishers, cleaning rags, items of clothing, paper etc. must not be stored or transported on or next to the heater.
- Defect fuses must only be replaced by fuses with the prescribed rating.
- If fuel leaks from the heater fuel system, arrange for the damage to be repaired immediately by a JE service partner.
- When topping up the coolant, only use the coolant permitted by the vehicle manufacturer, see the vehicle operating manual. Any blending with unpermitted coolant can cause damage to the engine and heater.
- After-running of the heater must not be interrupted prematurely e.g. by pressing the battery disconnecting switch, apart from in the case of an emergency stop.

PLEASE NOTE!

Following installation, attach the “Switch off heater before refuelling!” sticker near the tank filler neck.

ACCIDENT PREVENTION

General accident prevention regulations and the corresponding workshop and operation safety instructions are to be observed.

SAFETY INSTRUCTIONS FOR INSTALLATION AND OPERATION

⚠ WARNING TO INSTALLER!

- Correct installation of this heater is necessary to ensure safe and proper operation.

Read and understand this manual before attempting to install the heater. Failure to follow all these instructions could cause serious or fatal injury.

⚠ WARNING: EXPLOSION HAZARD!

- Do not install heater in enclosed areas where combustible fumes may be present.
- Do not install heaters in engine compartments of marine vessals.

⚠ WARNING: SAFETY HAZARD ON COOLANT HEATERS USED WITH IMPORPER ANTIFREEZE MIXTURES!

- The use of Eberspaecher coolant heaters requires that the coolant in the system to be heated contains a proper mixture of water and antifreeze to prevent coolant from freezing or slushing.
- If the coolant becomes slushy or frozen, the heater’s coolant pump can not move the coolant causing a blockage of the circulating system. Once this occurs, pressure will build up rapidly in the heater and the coolant hose will either burst or blow off at the connection point to the heater.
- This situation could cause engine damage and/or personal injury. Extreme care should be taken to ensure a proper mixture of water and antifreeze is used in the coolant system.
- Refer to the engine manufacturer’s or coolant manufacturer’s recommendations for your specific requirements.

⚠ CAUTION!

- During electrical welding work on the vehicle disconnect the power to the heater in order to protect the control unit.

PLEASE NOTE!

All measurements contained in this manual contain metric and approximate SAE equivalents in brackets eg. 25mm (1”).

Heating at high altitudes

The combustion behaviour of the heater changes with increasing altitude, due to the lower air density.The heater has an automatic altitude detection device which it uses to automatically compensate for the change in air density, i.e. the combustion ratio between fuel and air is adapted to the ambient conditions by reducing the fuel quantity.

PLEASE NOTE!

- The usual switching limit for altitude detection lies between 1000 m asl and 2000 m asl and solely depends on the local climatic conditions.
- The maximum heating output of the Hydronic M10 / M12 in “Altitude Mode” is 8.5 kW.
- The Hydronic M8 Biodiesel does not have an altitude detection device. Unrestricted heating mode is possible up to 1500 m asl.
- Heaters suitable for high altitudes have “H Kit” marked on the side of the nameplate.

Direct questions to Eberspaecher Climate Control Systems:
U.S.A.& Canada1-800-387-4800 Ext: 2299
or CA-TO-TechServices@eberspaecher.com

PLEASE NOTE!

This publication was correct at the time of print. However, Eberspaecher Climate Control Systems has a policy of continuous improvement and reserves the right to amend any specifications without prior notice.

TECHNICAL DATA						
Heater type			Hydronic M-II			
Heater			Hydronic M8 Biodiesel			
Version			D 8 W			
Heating medium			Mixture of water and antifreeze (Proportion of antifreeze at least 10 % up to 50 % maximum)			
Control of the heat flow			Power	Large	Medium	Small
Heat flow (Watts/BTUs) Figures for operation with diesel fuel. If operated with FAME the heat flow can reduce by up to 15 %.			8000 27300	5000 17000	3500 12000	1500 5120
Fuel consumption (l/h)			0.90	0.65	0.40	0.18
Electrical power (watt)		in operation	55	46	39	35
		at start – after 25 Sec.	200			
		in the control phase “OFF”	32			
Rated voltage			12 Volt		24 Volt	
Operating range • Lower voltage limit: An undervoltage protection in the controller switches the heater off on reaching the voltage limit.			10 Volt		20 Volt	
• Upper voltage limit: An overvoltage protection in the controller the switches the heater off on reaching voltage limit.			15 Volt		30 Volt	
Tolerable operating pressure			Up to 2 bar overpressure			
Flow rate of the water pump at 0.14 bar			1400 l/h			
Minimum water flow rate of the heater			500 l/h			
Fuel – see also “Fuel quality diesel heaters” page 28			Commercially available diesel (DIN EN 590) FAME – for diesel engines according to DIN EN 14 214			
Tolerable operating temperature			Operation		Not running	
	Heater / Control box	Diesel	–40 °C to +80 °C		–40 °C to +85 °C	
		FAME	–8 °C to +80 °C		–40 °C to +85 °C	
	Metering pump	Diesel	–40 °C to +50 °C		–40 °C to +85 °C	
		FAME	–8 °C to +50 °C		–40 °C to +85 °C	
Interference suppression class			Interference suppression class 5 to DIN EN 55 025			
Weight with controller and water pump, without metering pump			Approx. 6.2 kg			

⚠ CAUTION!

SAFETY INSTRUCTIONS FOR TECHNICAL DATA
The heater control unit is equipped with a low voltage cutout to prevent vehicle battery drain and a high voltage cutout to protect heaterelectrical parts.

PLEASE NOTE!
Provided no limit values are given, the technical data listed is subject to the tolerances usually applicable to heaters of ±10% for nominal voltage, ambient temperature 20 °C and reference altitude of Esslingen.

2 Product Information

TECHNICAL DATA						
Heater type			Hydronic M-II			
Heater			Hydronic M10			
Version			D 10 W			
Heating medium			Mixture of water and antifreeze (Proportion of antifreeze at least 10 % up to 50 % maximum)			
Control of the heat flow			Power	Large	Medium	Small
Heat flow (Watts/BTUs)			9500 32450	8000 27300	3500 12000	1500 5120
Fuel consumption (l/h)			1.2	0.9	0.4	0.18
Electrical power (watt)		in operation	86	60	39	35
		at start – after 25 Sec.	120			
		in the control phase “OFF”	32			
Rated voltage			12 Volt		24 Volt	
Operating range • Lower voltage limit: An undervoltage protection in the controller switches the heater off on reaching the voltage limit.			10 Volt		20 Volt	
• Upper voltage limit: An overvoltage protection in the controller the switches the heater off on reaching voltage limit.			15 Volt		30 Volt	
Tolerable operating pressure			Up to 2 bar overpressure			
Flow rate of the water pump at 0.14 bar			1400 l/h			
Minimum water flow rate of the heater			500 l/h			
Fuel – see also “Fuel quality diesel heaters” page 28			Commercially available diesel (DIN EN 590) FAME – for diesel engines according to DIN EN 14 214			
Tolerable operating temperature			Operation		Not running	
	Heater / Control box	Diesel	–40 °C to +80 °C		–40 °C to +85 °C	
		FAME	–8 °C to +80 °C		–40 °C to +85 °C	
	Metering pump	Diesel	–40 °C to +50 °C		–40 °C to +85 °C	
		FAME	–8 °C to +50 °C		–40 °C to +85 °C	
Interference suppression class			Interference suppression class 5 to DIN EN 55 025			
Weight with controller and water pump, without metering pump			Approx. 6.2 kg			

⚠ CAUTION!

SAFETY INSTRUCTIONS TECHNICAL DATA
Failure to comply with the technical data can result in malfunctions.

PLEASE NOTE!
Provided no limit values are given, the technical data listed is subject to the tolerances usually applicable to heaters of ±10% for nominal voltage, ambient temperature 20 °C and reference altitude of Esslingen.

2 Product Information

TECHNICAL DATA							
Heater type			Hydronic M-II				
Heater			Hydronic M12				
Version			D 12 W				
Heating medium			Mixture of water and antifreeze (Proportion of antifreeze at least 10 % up to 50 % maximum)				
Control of the heat flow			Power	Large	Medium 1	Medium 2	Medium 3	Small
Heat flow (Watts/BTUs)			12000 42000	9500 32450	5000 17000	3500 12000	1500 5120	1200 4100
Fuel consumption (l/h)			1.5	1.2	0.65	0.40	0.18	0.15
Electrical power (watt)		in operation	132	86	46	39	35	34
		at start – after 25 Sec.	120					
		in the control phase “OFF”	32					
Rated voltage			12 Volt			24 Volt		
Operating range • Lower voltage limit: An undervoltage protection in the controller switches the heater off on reaching the voltage limit.			10 Volt			20 Volt		
• Upper voltage limit: An overvoltage protection in the controller the switches the heater off on reaching voltage limit.			15 Volt			30 Volt		
Tolerable operating pressure			Up to 2 bar overpressure					
Flow rate of the water pump at 0.14 bar			1400 l/h					
Minimum water flow rate of the heater			500 l/h					
Fuel – see also “Fuel quality diesel heaters” page 28			Commercially available diesel (DIN EN 590) FAME – for diesel engines according to DIN EN 14 214					
Tolerable operating temperature			Operation			Not running		
	Heater / Control box	Diesel	–40 °C to +80 °C			–40 °C to +85 °C		
		FAME	–8 °C to +80 °C			–40 °C to +85 °C		
	Metering pump	Diesel	–40 °C to +50 °C			–40 °C to +85 °C		
		FAME	–8 °C to +50 °C			–40 °C to +85 °C		
Interference suppression class			Interference suppression class 5 to DIN EN 55 025					
Weight with controller and water pump, without metering pump			Approx. 6.2 kg					

⚠ CAUTION!

SAFETY INSTRUCTIONS FOR TECHNICAL DATA
Failure to comply with the technical data can result in malfunctions.

PLEASE NOTE!
Provided no limit values are given, the technical data listed is subject to the tolerances usually applicable to heaters of ±10% for nominal voltage, ambient temperature 20 °C and reference altitude of Esslingen.

2 Product Information

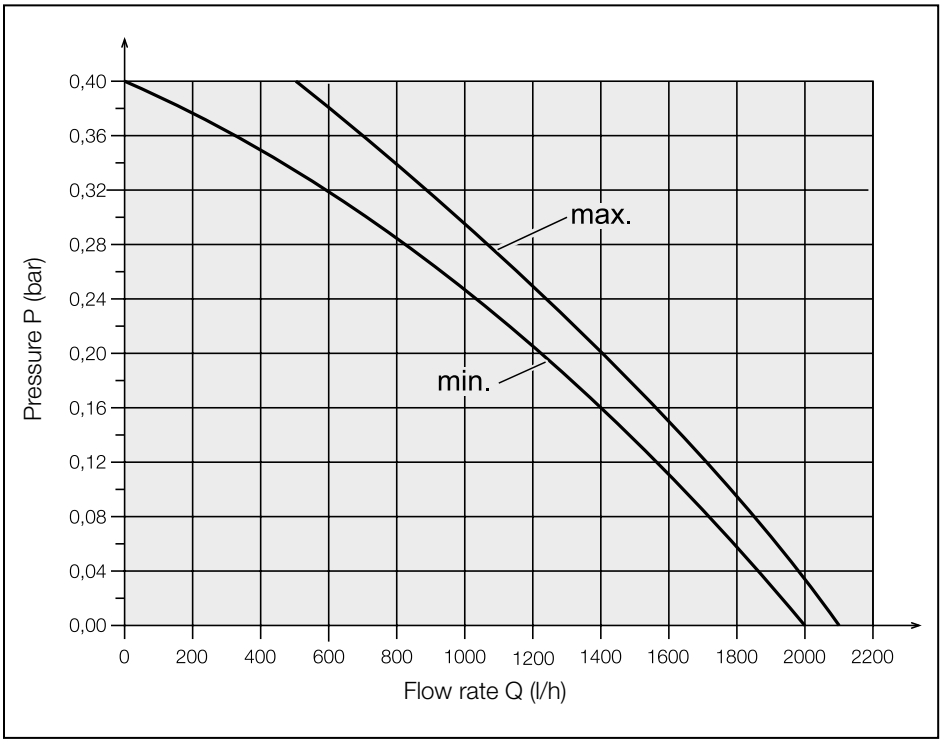
WATER PUMP		
Rated voltage	12 Volt	24 Volt
Operating range	8.5 Volt to 16 Volt	18 Volt to 33 Volt
Electrical power consumption	32 watt	
Water flow rate around 0.3 bar	700 l/h	
Operating temperature	–40 °C to +100 °C	
Storage temperature	–40 °C to +120 °C	

Technical data ±10 %

⚠ **CAUTION!**

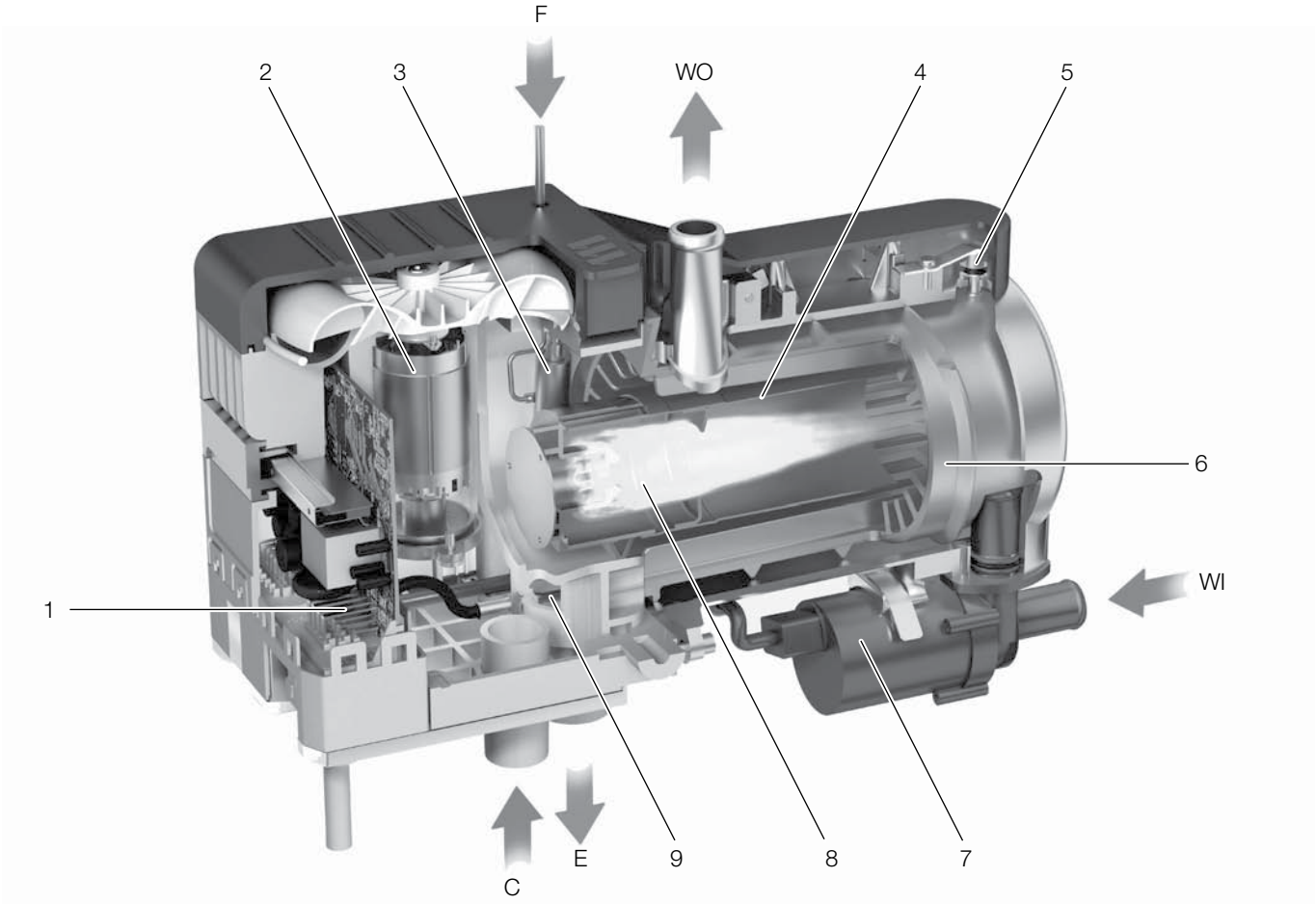
SAFETY INSTRUCTIONS FOR TECHNICAL DATA
Failure to comply with the technical data can result in malfunctions.

DELIVERY CURVE OF THE WATER PUMP



HEATER COMPONENTS

HYDRONIC M-II - 12 & 24 VOLT

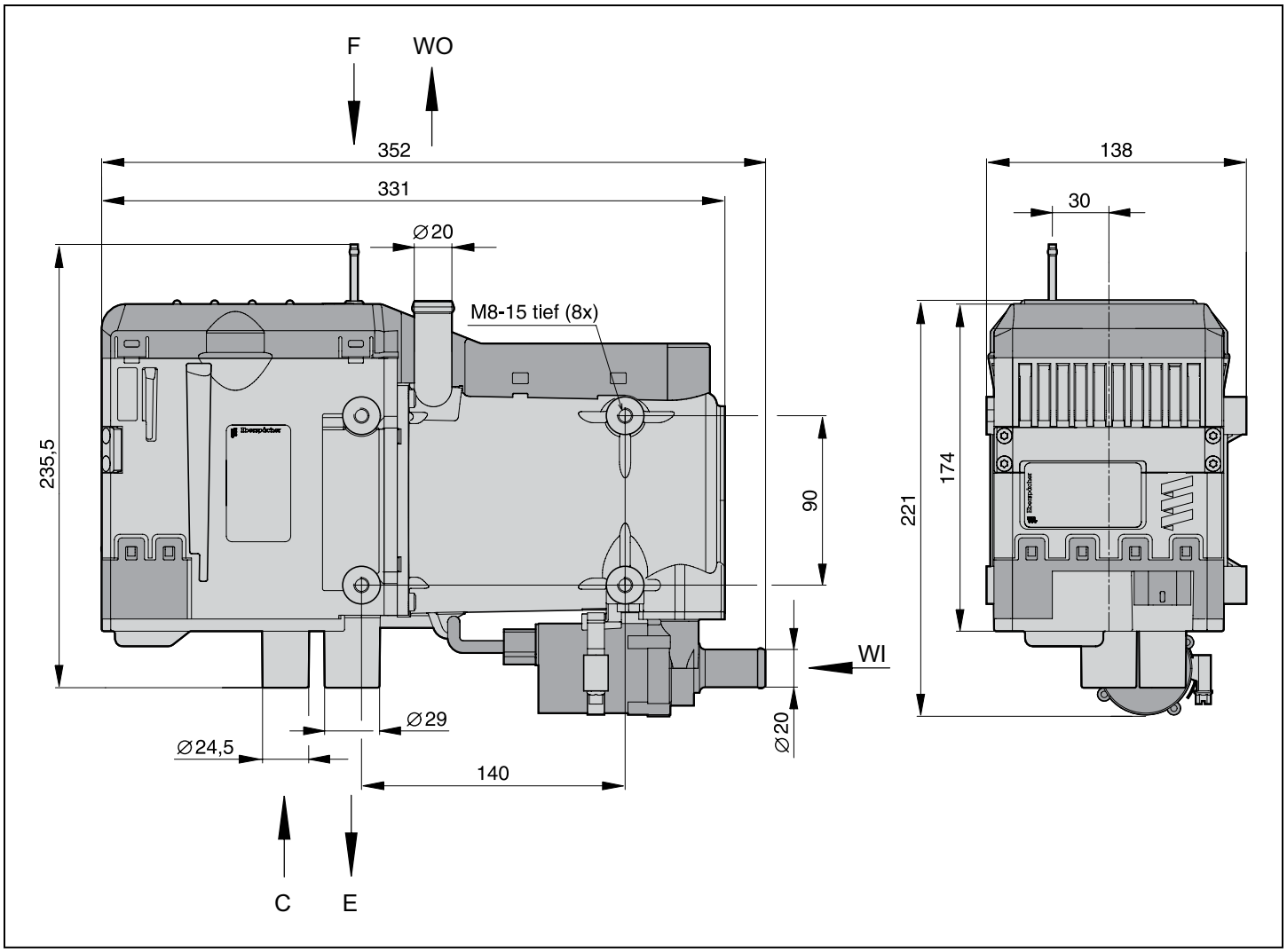


1 Control box
2 Burner motor
3 glow pin
4 Flame pipe
5 Overheating sensor
6 Heat exchanger
7 Water pump
8 Combustion chamber
9 Flame sensor

C = Combustion air
E = Exhaust
F = Fuel supply line
WO = Water Outlet
WI = Water Inlet

2 Product Information

MAIN DIMENSIONS



C = Combustion air
E = Exhaust
F = Fuel supply line
WO = Water Outlet
WI = Water Inlet

* All measurements are in millimeters 25.4 mm = 1”
Boxed Heaters Ensure:
Minimum installation distance (clearance) to open the lid and to dismount the glow pin and the control unit.

Ensure:
Minimum installation distance (clearance) to take in combustion air.

3 Installation

INSTALLATION

INSTALLATION LOCATION

The installation location for the heater is the engine compartment. The heater must be mounted below the min. cooling water level (compensation tank, cooler, vehicle heat exchanger) for automatic venting of the heat exchanger of the heater and the water pump.

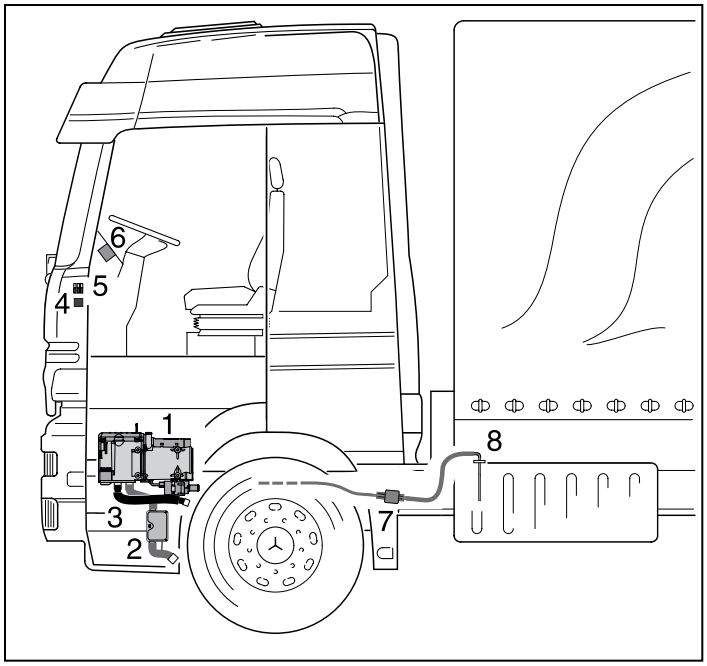
PLEASE NOTE!

- In a truck, the water heater is preferably fastened underneath the driver's cab in the longitudinal beam near the vehicle engine.
- The regulations and safety instructions to be observed for this chapter are stated on page 6.
- The installation suggestions made in the installation instructions are examples. Other installation locations are possible if they correspond to the installation requirements stated in these installation instructions.
- Other installation information (e.g. for boats and ships) is available from the manufacturer on request.
- Please take note of the installation locations together with the operating and storage temperatures.

INSTALLING THE 24V HEATER IN A VEHICLE FOR THE TRANSPORT OF DANGEROUS GOODS AS PER ADR (EUROPEAN AGREEMENT ABOUT THE INTERNATIONAL TRANSPORT OF DANGEROUS GOODS ON THE ROAD)

For installation of the heater in vehicles for the transport of dangerous goods, the regulations of ADR / ADR99 must be observed.
With the appropriate electrical wiring the heater fulfils the ADR regulations, see the "Additional Regulations" on page 5, the "Control and Safety Devices" on page 36.
and the "Circuit Diagrams" on page 45 and 46.

INSTALLATION EXAMPLE HEATER IN A TRUCK



1 Heater
2 Exhaust pipe with exhaust silencer
3 Combustion air intake silencer
4 Fan relay
5 Fuse bracket
6 Controls
7 Metering pump
8 Tank connection

3 Installation

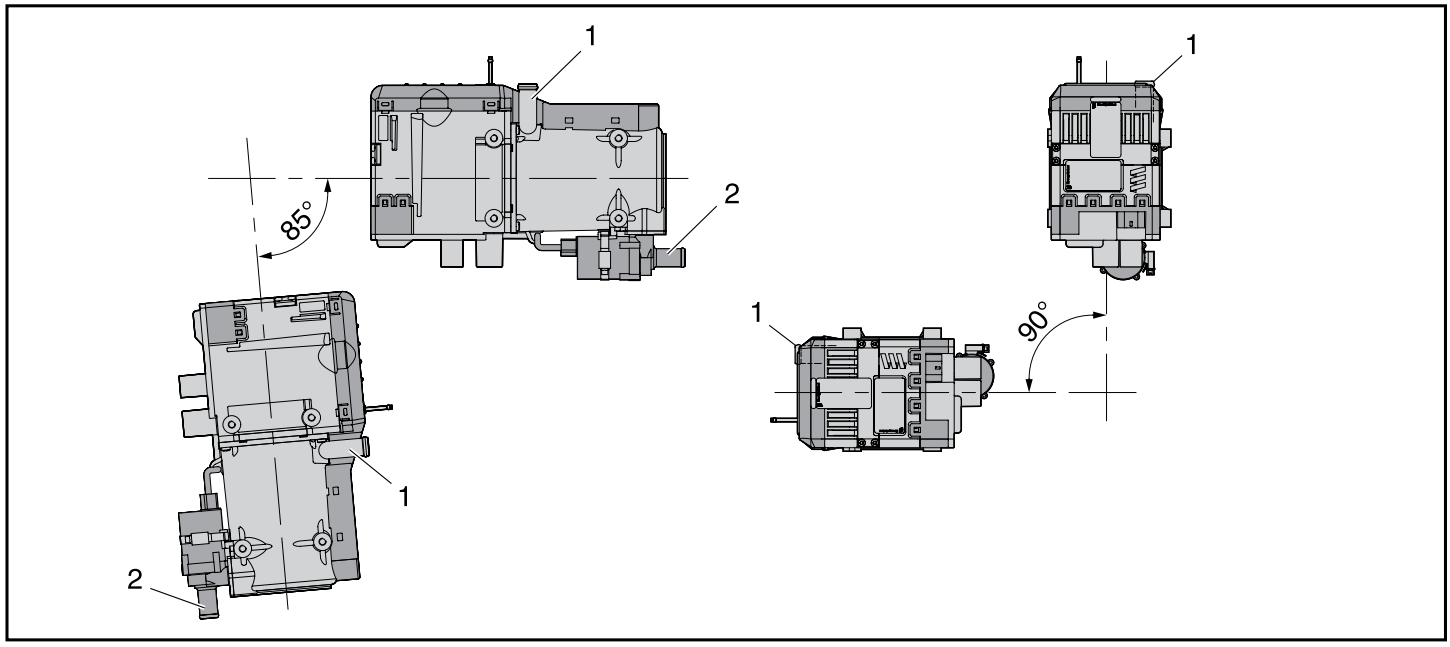
POSSIBLE INSTALLATION POSITIONS

The heater should preferably be installed in the normal position, horizontal with the exhaust connection down to the bottom.
Depending on the installation conditions, the heater can also be mounted in the permitted swivel range, see diagram.

When the heater is operating, the shown normal or maximum installation positions can be varied briefly by up to +15° in all directions. Such deviations caused by the inclined position of the vehicle do not impair the heater functions in any way.

NORMAL POSITION WITH PERMITTED SWIVEL RANGE

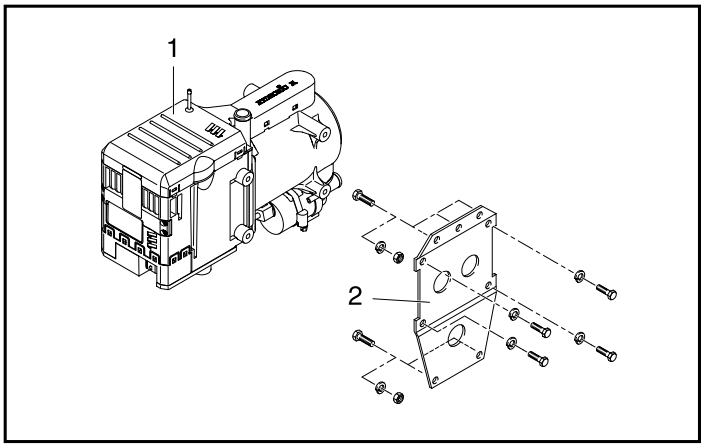
- Swivel range from the normal position swivelled up to max. 85° downward – the heater's water outlet socket is horizontal. The water pump's water inlet socket must face downward.
- Swivel range from the normal position swivelled up to max. 90° to the left about the longitudinal axis – the water outlet socket is at the top of the heater and faces the left.



1 Water outlet socket, heater
2 Water inlet socket, water pump

MOUNTING AND FASTENING

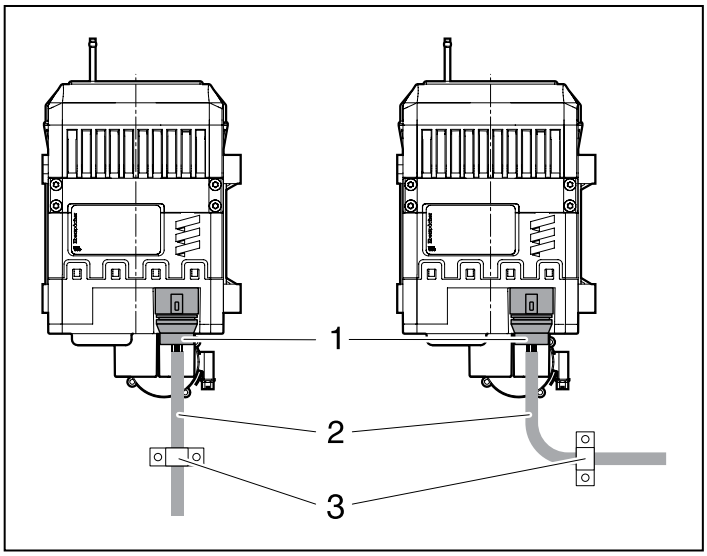
Fix the unit holder from the installation kit to the heater using 4 hexagon screws M8 and 4 spring washers (tightening torque 12$^{+0.5}$ Nm).
Fix the heater and the mounted unit holder in a suitable 5 place in the vehicle using 5 hexagon screws M8, 5 spring washers and 5 hexagon nuts M8 (tightening torque 12$^{+0.5}$ Nm).



1 Heater
2 Heater bracket

CONNECT AND LAY CABLE HARNESS TO HEATER

Connect the 12-pin connector of the cable harness to the heater.
Always route the cable harness straight out of the unit connector and fix it so that no forces can be exerted on the connector via the cable harness.



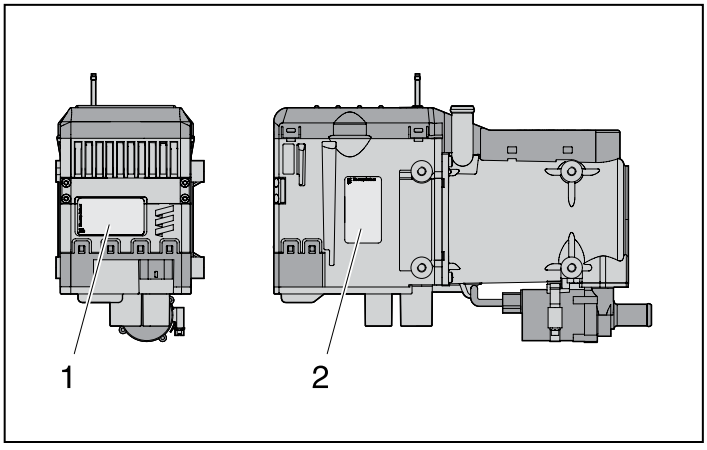
1 12-pin connector
2 Cable harness
3 Fixing

NAMEPLATE

The nameplate is on the front and the 2nd nameplate (duplicate) is fixed to the side of the control box / fan unit.
If required, the installer can stick the duplicate nameplate in a clearly visible position elsewhere on the heater or near to the heater.

PLEASE NOTE!

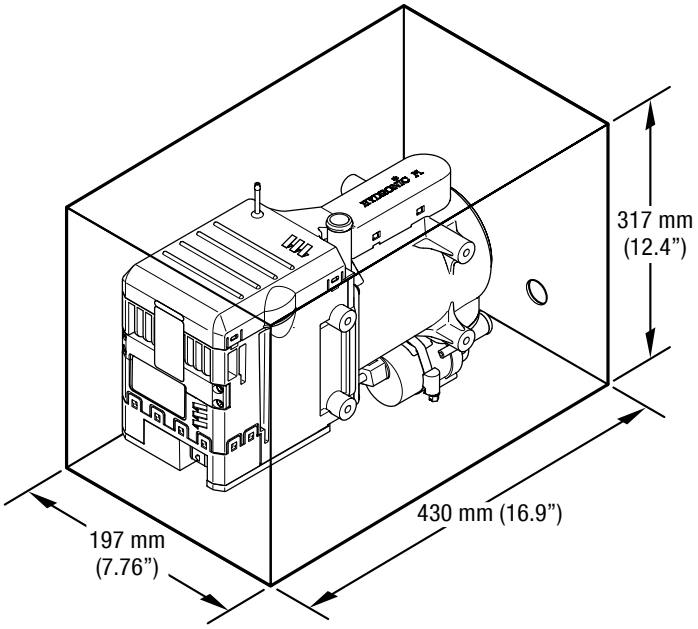
The regulations and safety instructions to be observed for this chapter are stated on pages 4-6.



1 Original nameplate
2 2nd nameplate (duplicate)

3 Installation

PRINCIPAL DIMENSIONS - BOXED VERSION



* All measurements are in millimeters 25.4 mm = 1"

Boxed Heaters Insure:
Minimum installation distance (clearance) to open the lid and to dismount the glow pin and the control unit.

Insure:
Minimum installation distance (clearance) to take in combustion air.

HEATER LOCATION

Always mount the heater in a protected area. Eg: storage compartment, engine compartments or step box.
Eberspaecher recommends you use the boxed unit. Refer to Fig. 1

When mounting the heater adhere to the following conditions:
- Situate the heater below the normal coolant level of the engine.
- Guard against excessive road spray.
- Keep coolant hoses, fuel lines and electrical wiring as short as possible.

HEATER MOUNTING

Mount the heater using the four (4) shock mounts provided with kit and one of the following mounting methods:

- Use the Side Mount Bracket to mount the heater on the side of the frame rail.
- Use a spare step box or battery box.
- Use the saddle bracket and hardware provided

⚠ **CAUTION!**
Guard the heater against excessive road spray to avoid internal corrosion.

ARRANGEMENT OF THE HEATER

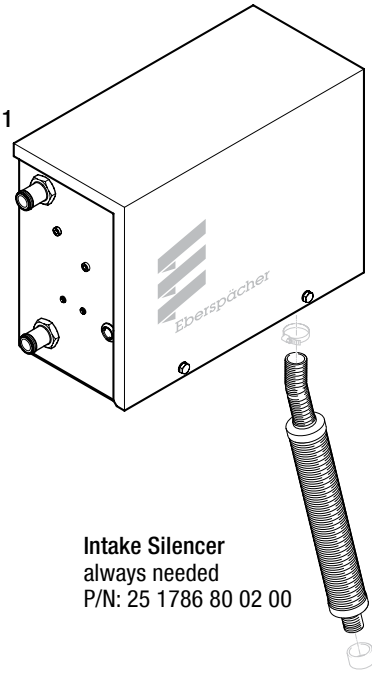
Parts of the structure and other components near the heater must be protected from excess heat exposure and possible contamination from fuel or oil.
The heater must not pose a fire hazard even when it overheats.
– This requirement is deemed to be fulfilled when adequate clearance to all parts is observed during installation, sufficient ventilation is provided and fireproof materials or heat plates are used.

The heater must not be located in the passenger compartment.
A unit may however be used in a hermetically sealed housing which also corresponds to the conditions stated above.

The factory nameplate or duplicate must be affixed so that it can still be easily read when the heater is installed in the vehicle.

All appropriate precautions must be taken when arranging the heater to minimise the risk of injuries to persons or damage to other property.

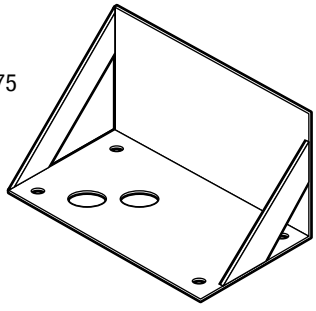
Fig.1



Box Base
P/N: 25 2800 40 10 06

Box Lid
P/N: 25 2800 40 10 07

Intake Silencer
always needed
P/N: 25 1786 80 02 00



Side Mount Bracket
P/N: 20 2900 40 00 75

CONNECTION TO THE COOLING WATER CIRCUIT

The heater is connected to the cooling water circuit in the water feed pipe from the vehicle engine to the heat exchanger. There are three possible alternative installations here.
The alternatives are described on pages 18 – 20.

⚠ CAUTION!
RISK OF INJURIES AND BURNS!

It is possible for the coolant and components of the coolant circuit to get very hot.

- Parts conveying water must be routed and fastened in such a way that they pose no temperature risk to man, animals or material sensitive to temperature from radiation / direct contact.
- Before working on the coolant circuit, switch the heater off and wait until all components have cooled down completely, if necessary where safety gloves.

Follow these guidelines and refer to the engine plumbing diagram.

- Install hose fittings into the engine block for pick-up and return lines.
- Use existing holes in the engine block (ie. remove blanking plugs when possible).
- Use shut off valves to ensure the system can be isolated from the engine when not in use. Alternatively “T” piece connectors in existing coolant hoses can be used if no blanking plugs are available.
- Provide 20mm (3/4”) hose barbs for hose connections.
- Use 20mm (3/4”) hoses to ensure adequate coolant flow.
- Keep the pick up and return points as far apart as possible to ensure good heat distribution.
- Take the coolant from a low point on the engine to reduce aeration in the system.
- Ensure proper direction of coolant flow by taking coolant from a high pressure point in the engine and returning it to a low pressure point. (ie. pickup from back of block and return to the suction side of the engine’s water pump).
- Ensure adequate flow rate through the heater by comparing the incoming and outgoing coolant temperatures while the heater is running. If the rise in temperature exceeds 10°C (18°F), coolant flow must be increased by modifying the plumbing.
- Ensure the heater and water pump are installed as low as possible to allow the purging of air.
- If a bunk heat exchanger is incorporated into the system, proper plumbing layouts must be followed.

PLEASE NOTE!

- When installing the heater, please take note of the direction of flow of the coolant circuit.
- Fill the heater and water hose with anti-freeze before connecting to the cooling water circuit.
- Route the water hoses without any kinks, and in a rising position if possible.
- Where possible, the water circuit must be installed so that a cooling water temperature of approx. +60 °C is achieved after approx. 30 min.
- When routing the water pipes, observe a sufficient clearance to hot vehicle parts.
- Protect all water hoses / water pipes from chafing and from extreme temperatures.
- Secure all hose connections with hose clips.
(tightening torque = 1.5 Nm)
- After the vehicle has been operating for 2 hours or travelled 100 km, tighten the hose clips again.
- The minimum water flow rate is only guaranteed if the temperature difference of the heating medium does not exceed 15 K between water inlet and water outlet during heating.
- Only overpressure valves with an opening pressure of min. 0.4 – max. 2 bar may be used in the coolant circuit.
- The cooling water must contain at least 10 % antifreeze all year round as corrosion protection. Fresh water will corrode internal heater parts.
- During cold periods the cooling water must contain sufficient antifreeze.
- Before commissioning the heater or after changing the cooling liquid, the whole coolant circuit including heater must be vented free of bubbles according to the instructions issued by the vehicle manufacturer.
- Only top up with antifreeze approved by the vehicle manufacturer.

3 Installation

CONNECTION TO THE COOLING WATER CIRCUIT
INTEGRATE THE HEATER WITH NON-RETURN VALVE IN THE COOLANT CIRCUIT

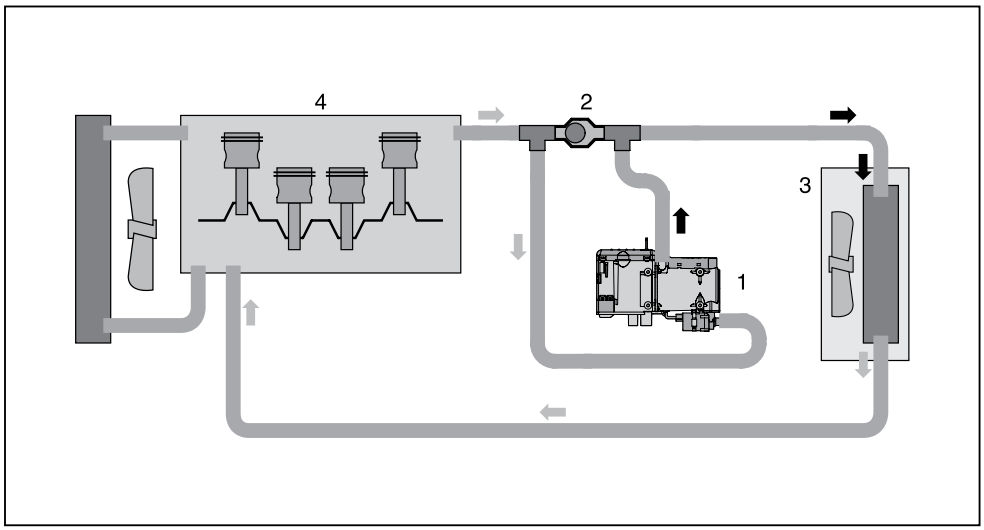
Disconnect the water feed pipe from the vehicle engine to the vehicle heat exchanger and insert the non-return valve. Connect the heater with its water pipes to the non-return valve.

Advantage:
Simple installation.

Disadvantage:
The coolant flows through the vehicle engine constantly so that in large vehicle engines, adequate cab heating is scarcely possible.

HEATING CHARACTERISTICS:

When the heater is switched on, the heat flows through the vehicle heat exchanger and the vehicle engine.
Once the cooling water has reached a temperature of approx. 55 °C, depending on the selected fan setting the vehicle fan is switched on and the heat is also conveyed to the passenger compartment.



1 Heater
2 Non-return valve
3 Heat exchanger
4 Vehicle engine

PLEASE NOTE!

Non-return valve must be ordered separately, please refer to the product information for the Order No.

CONNECTION TO THE COOLING CIRCUIT

INTEGRATE THE HEATER WITH NON-RETURN VALVE, THERMOSTAT AND T-PIECE IN THE COOLANT CIRCUIT

Disconnect the water feed pipe from the vehicle engine to the vehicle heat exchanger and insert the non-return valve.

Disconnect the water return pipe from the heat exchanger to the vehicle engine and insert the T-piece.

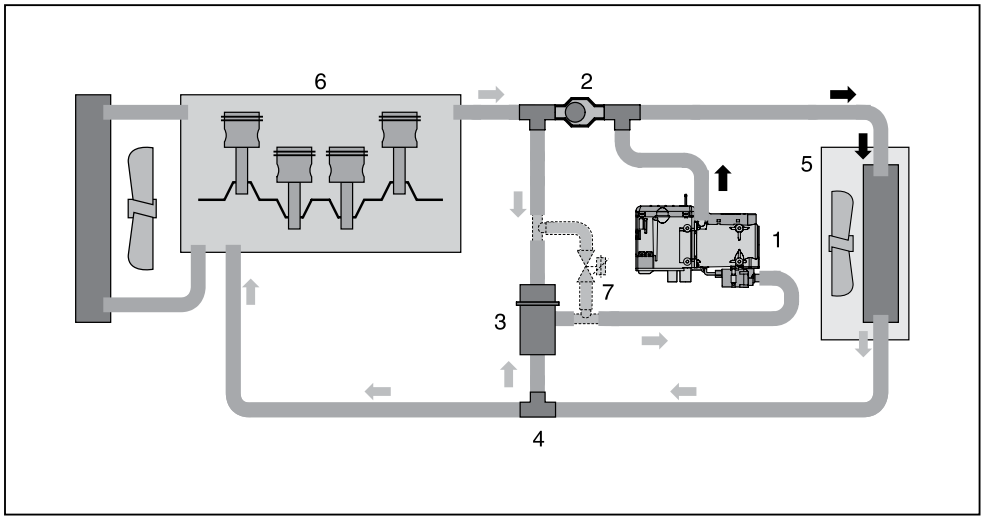
Connect the heater and thermostat with water hoses to the non-return vale and T-piece as shown in the diagram.

Option:
In addition a solenoid can be fitted in the water circuit. When open, this bypasses the thermostat and pre-heats the engine as soon as the heater starts to work.

HEATING CHARACTERISTICS:

- SMALL COOLANT CIRCUIT: FAST HEATING OF THE PASSENGER COMPARTMENT
  Initially the heat produced by the heater is only conveyed to the vehicle heat exchanger up to a cooling water temperature of approx. 70 °C.
  The vehicle fan switches on at approx. 55 °C.

- LARGE COOLING WATER CIRCUIT: HEATING OF THE PASSENGER COMPARTMENT AND ADDITIONAL ENGINE PRE-HEATING
  If the cooling water temperature continues to increase, the thermostat slowly changes over to the large circuit (full change-over at approx. 75 °C).



1 Heater
2 Non-return valve
3 Thermostat
4 T-piece
5 Heat exchanger
6 Vehicle engine
7 Solenoid (option)

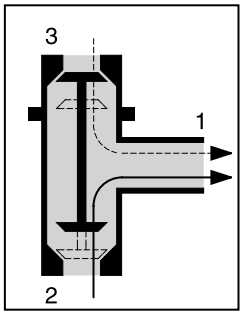
PLEASE NOTE!

The thermostat, non-return valve and T-piece must be ordered separately, please refer to the product information for the Order No.
The solenoid valve has to be purchased through the trade.

THERMOSTAT FUNCTIONS:

SMALLCOOLANTCIRCUIT
Cooling water temperature < 70 °C:
Connection no. 1: open to the heater
Connection no. 2: open to the T-piece
Connection no. 3: closed to the non-return valve

SMALLCOOLANTCIRCUIT
Cooling water temperature > 75 °C:
Connection no. 1: open to the heater
Connection no. 2: closed to the T-piece
Connection no. 3: open to the non-return valve



1 Connection to the heater
2 Connection to the T-piece
3 Connection to the non-return valve

PLEASE NOTE!

Integrate the thermostat into the water circuit with connections (1) (2) and (3) as shown in the diagram.

CONNECTION TO THE COOLANT CIRCUIT

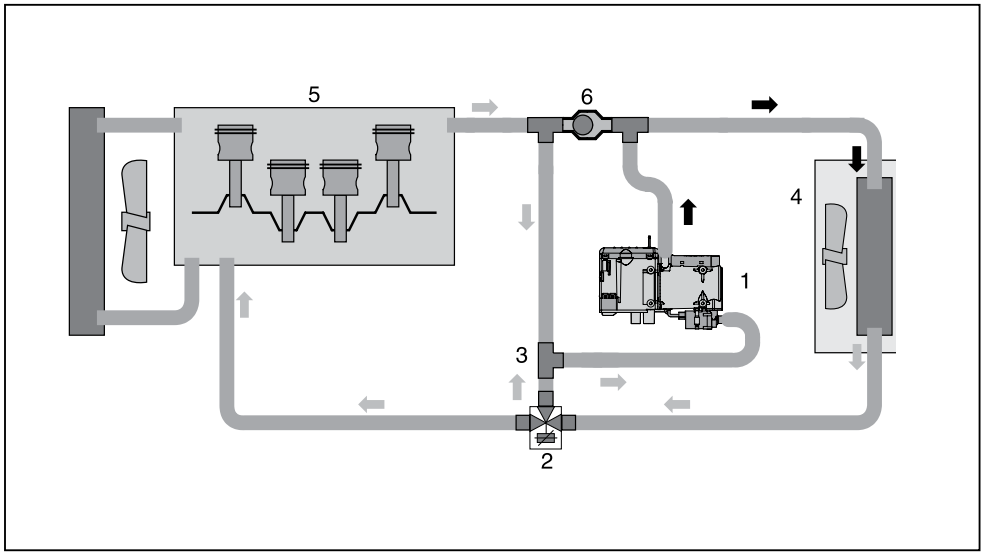
INTEGRATE THE HEATER WITH A SOLENOID IN THE COOLANT CIRCUIT

Disconnect the water flow hose from the vehicle's engine to the vehicle's heat exchanger and insert two T-pieces. Connect the T-pieces with a hose.
Disconnect the water return pipe from the heat exchanger to the vehicle engine and insert the solenoid.
Connect the heater and the solenoid to the T-piece with water pipes, as shown in the diagram.

Option:
In addition, a non-return valve with connection hoses between the two T-pieces can be inserted in the cooling water circuit.
This prevents the loss of effective vehicle heating when the heater is switched off.

HEATING CHARACTERISTICS:

By installing the electric solenoid valve, temperature independent choice between the small cooling water circuit (driver's cab) and large cooling water circuit (vehicle engine with driver's cab) is possible.
Alternatively, a plus signal from the 12-pin connector B2, PIN B1 to relay 2.5.7 can be used to control the solenoid valve; this enables automatic changeover of the solenoid valve.
Changeover to the large cooling water circuit at a cooling water temperature of 68 °C, if the temperature drops to 58 °C.
Changeover to the small cooling water circuit at a cooling water temperature of 63 °C, if the temperature drops to 45 °C.



1 Heater
2 Solenoid
3 T-piece
4 Heat exchanger
5 Vehicle engine
6 Non-return valve (option)

PLEASE NOTE!

T-pieces (tees) and non-return valve must be ordered separately, please refer to the product information for the Order No.
The solenoid valve has to be purchased through the trade.

EXHAUST SYSTEM

MOUNTING THE EXHAUST SYSTEM

The universal installation kit includes a flexible exhaust pipe, inner Ø 30 mm, 1300 mm long and an exhaust silencer.
The exhaust silencer must be installed.
The flexible exhaust pipe can be shortened to 20 cm or lengthened to max. 1.8 m, depending on the installation conditions.
Fasten the exhaust silencer to a suitable position in the vehicle.
Route the flexible exhaust pipe from the heater to the exhaust silencer and fasten with pipe clips.
If necessary, also fasten the flexible exhaust pipe with pipe clips at suitable positions in the vehicle.
Connect the exhaust end pipe to the exhaust silencer with an end sleeve and fasten with a pipe clip.

⚠ DANGER!
RISK OF INJURIES AND BURNS!

Every type of combustion produces high temperatures and toxic exhaust fumes. This is the reason why the exhaust system must be installed according to these instructions.

- Do not perform any work on the exhaust system while the heater is working.
- Before working on the exhaust system, first switch the heater off and wait until all parts have cooled down completely, wear safety gloves if necessary.
- Do not inhale exhaust fumes.

The coolant pump is the heart of the system and must be installed properly to ensure successful heater operation.

⚠ CAUTION!
RISK OF INJURIES AND BURNS!

- The exhaust outlet must end in the open air.
- The exhaust pipe must not protrude beyond the lateral limits of the vehicle.
- Install the exhaust pipe sloping slightly downwards. If necessary, make a drain hole approx. Ø 5 mm at the lowest point to drain off condensation.
- Important functional parts of the vehicle must not be impaired (keep sufficient clearance).
- Mount the exhaust pipe with sufficient clearance to heat-sensitive parts. Pay particular attention to fuel pipes (plastic or metal), electrical cables and brake hoses etc.!
- Exhaust pipes must be fastened safely (recommended clearance of 50cm) to avoid damage from vibrations.
- Route the exhaust system so that the emitted fumes are not sucked in with the combustion air.
- The mouth of the exhaust pipe must not get clogged by dirt and snow.
- The mouth of the exhaust pipe must not point in the direction of travel.
- Always fasten the exhaust silencer to the vehicle.
- The exhaust end pipe should be much shorter than the flexible exhaust pipe from the heater to the exhaust silencer.

PLEASE NOTE!

- Comply with the regulations and safety instructions for this chapter on pages 4 – 6.
- The exhaust end pipe should be much shorter than the flexible exhaust pipe from the heater to the exhaust silencer.
- Use pipe clips to secure all connections in the exhaust system.
- To avoid contact corrosion, the clips for fixing the exhaust pipe must be made of stainless steel. Please refer to the product information for the Order No. of the stainless steel fixing clips.

3 Installation

EXHAUST CONNECTION

A 30 mm flexible tube exhaust pipe with a length of 1m long is supplied with the kit for the exhaust. An exhaust clamp is needed to secure the exhaust to the the heater. The exhaust hose cannot be any longer than 1.8 m. Connect the exhaust as follows:

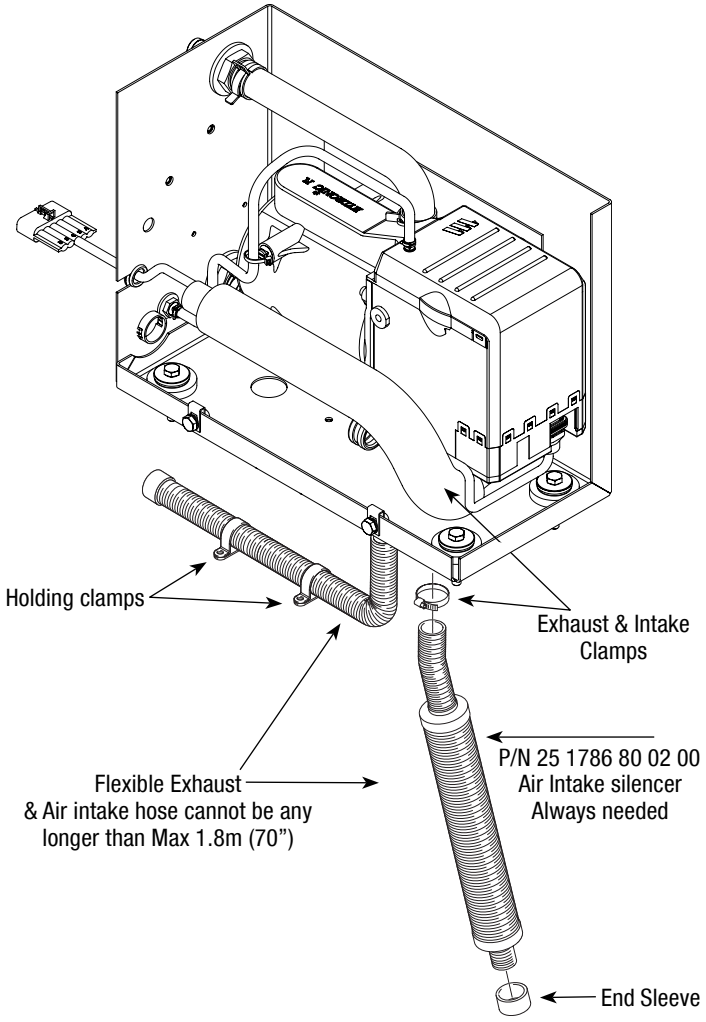
- Connect the exhaust pipe to the exhaust port on the heater and attach with clamp provided. Feed the exhaust pipe through the silicone (white) grommet on the bottom of the box.
- Run exhaust to an open area to the rear or side of the vehicle so that fumes can not build up and enter the passenger compartment or the heater combustion air intake.
- Install exhaust pipe with a slight slope or drill a small hole in the lowest point to allow water to run off. Any restriction in exhaust will cause operational problems.
- Route the exhaust pipe from the heater using holders provided.

⚠ CAUTION!
Run exhaust so that it cannot be plugged by dirt, water or snow. Ensure the outlet does not face into the vehicle slip stream.

PLEASE NOTE!

1. Exhaust hose cannot be any longer than 1.8m (70”)
2. Minimum length 0.2 m (8”)
3. Air intake silencer always needed.

ATTENTION: Refer to page 6 for High altitude capabilities.



⚠ WARNING! ASPHYXIATION HAZARD
Route exhaust beyond the skirt of the cab and outside of the frame area.
Route exhaust so that the exhaust fumes cannot enter the passenger compartment.
Failure to comply with this warning could result in asphyxiation.

⚠ WARNING! FIRER HAZARD
The exhaust is hot, keep a minimum of 5 cm (2”) clearance from any heat sensitive material. Failure to comply with this warning could result in fire and serious injury.

COMBUSTION AIR SYSTEM

MOUNTING THE COMBUSTION AIR SYSTEM

The universal installation kit includes an intake silencer, inner Ø 25 mm for the combustion air.
The intake silencer must be installed and, for heating mode up to 1500 m asl, can be extended by up to 2 m max. using a flexible pipe (inner Ø 25 mm) and a connection pipe (outer Ø 24 mm) – not included in the scope of supply.
Fasten the intake silencer and where applicable the flexible pipe at suitable points in the vehicle using fastening clips and cable ties.

PLEASE NOTE!

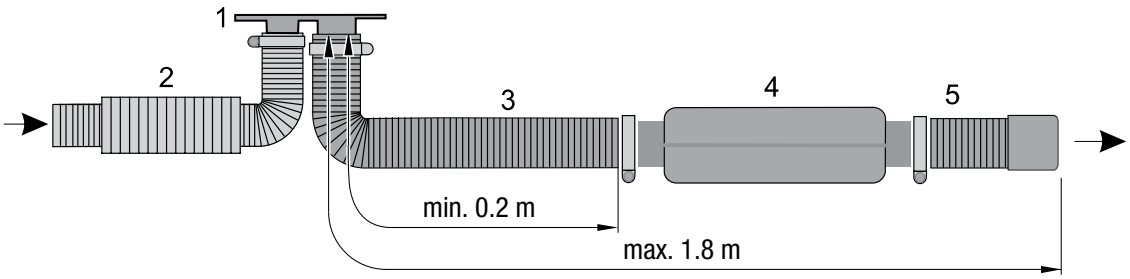
Comply with the regulations and safety instructions for this chapter on pages 4 – 6.

- Extension of the intake silencer is not allowed if mainly heating mode is used at high altitudes (over 1500 m asl).
- Use pipe clips to secure all connections in the combustion air system.
- For installation in ships and boats, see marine catalogue, if necessary consult the manufacturer.

⚠ CAUTION!
SAFETY INSTRUCTIONS FOR THE COMBUSTION AIR SYSTEM!

- The combustion air must be drawn from an area in which the maximum allowable temperature for the combustion air, of 45 °C, is not exceeded.
- The combustion air opening must be free at all times.
- Position the combustion air intake to be sure that exhaust fumes cannot be sucked in with the combustion air.
- The combustion air intake must not get clogged with dirt and snow.
- Install the combustion air intake system sloping slightly downwards.
- If necessary, make a drain hole approx. Ø 5 mm at the lowest point to drain off condensation.
- Avoid tight bends when laying the intake silencer and flexible pipe.
- Do not install the intake opening facing the vehicle slipstream.

ALLOWABLE COMBUSTION AIR AND EXHAUST PIPE LENGTH



With a combustion air system consisting only of one intake silencer, heating mode is possible up to an altitude 3500 m asl (with Hydronic M10 / M12 only).
Flexible Exhaust & Air intake hose cannot be any longer than Max 1.8m (70.9")

1 Heater flange
2 Intake silencer, 565 mm long (order No. 25 1786 80 02 00)
3 Flexible exhaust pipe
4 Exhaust silencer
5 Flexible exhaust end pipe

3 Installation

FUEL SUPPLY

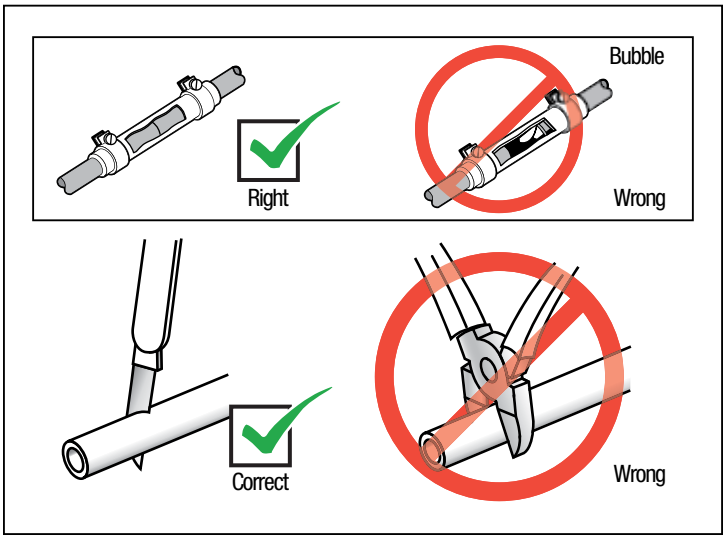
MOUNTING THE METERING PUMP, ROUTING THE FUEL PIPE SAND MOUNTING THE FUEL TANK

The following safety instructions must be observed when mounting the metering pump, routing the fuel pipes and mounting the fuel tank.

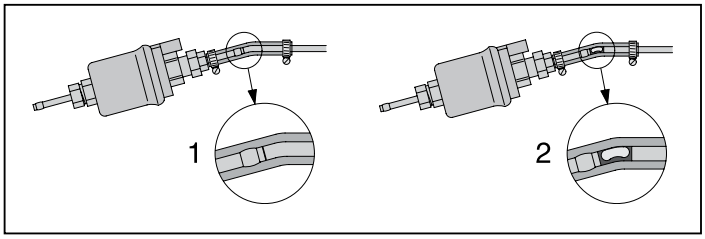
⚠ DANGER!
RISK OF FIRE, EXPLOSION, POISONING AND INJURIES!

Caution when handling fuel.
- Switch off the vehicle engine and heater before refuelling and before working on the fuel supply.
- No naked lights when handling fuel.
- Do not smoke.
- Do not inhale fuel vapours.
- Avoid any contact with the skin.

⚠ CAUTION!
SAFETY INSTRUCTIONS FOR THE COMBUSTION AIR SYSTEM!
- Only use a sharp knife to cut off fuel hoses and pipes. Interfaces must not be crushed and must be free of burrs.



- The fuel pipe from the metering pump to the heater should be routed at a continuous rise.
- Fuel pipes must be fastened safely to avoid any damage and / or noise production from vibrations (recommended clearance of approx. 50 cm).
- Fuel pipes must be protected from any mechanical damage.
- Route the fuel pipes so that any distortion of the vehicle, engine movements etc. cannot have any lasting effect on the service life.
- Parts carrying fuel must be protected from interfering heat.
- Never route or fasten the fuel pipes to the heater or vehicle exhaust system. When the systems cross, always ensure there is a sufficient heat clearance. If necessary, install heat deflection plates.
- Dripping or evaporating fuel must never be allowed to collect on hot parts or ignite on electric systems.
- When connecting fuel pipes with a fuel hose, always mount the fuel pipes in a butt joint to prevent any bubbles from forming.
- Use Eberspaecher approved fuel lines.
- Other sizes or types of fuel lines may inhibit proper fuel flow.



1 Correct connection
2 Incorrect connection – bubble formation

PLEASE NOTE!
- Deviations from the instructions stated here are not allowed.
- Failure to comply can result in malfunctions.
- When replacing the Hydronic M (Hydronic 10) with the Hydronic M-II, the metering pump must be replaced too.
- The Hydronic M-II boxed unit is most commonly provided with the fuel metering pump mounted inside the box. This is to reduce installation time and to protect the pump from corrosion. If specifications cannot be met the pump must be mounted externally.
  See illustration for connections and specifications. All parts necessary to do the installation are included in the kit as shown.

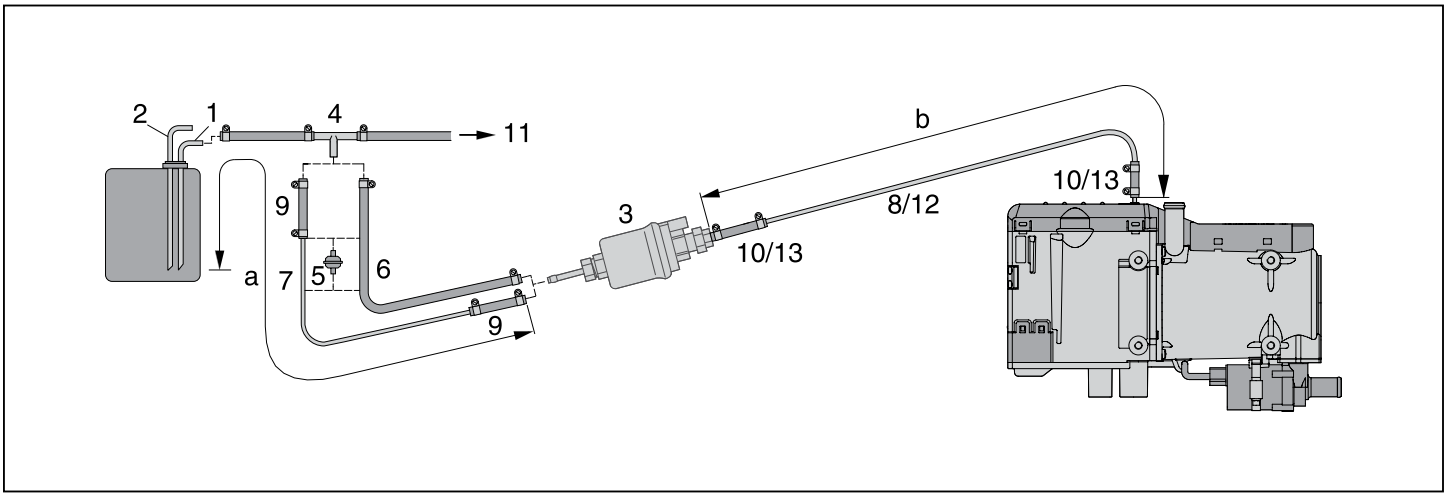
SAFETY INSTRUCTIONS FOR FUEL PIPE SAND FUEL TANKS IN BUSES AND COACHES

- In buses and coaches, fuel pipes and fuel tanks must not be routed through the passenger compartment or driver's cab.
- Fuel tanks in buses and coaches must be positioned in such a way that the exits are not in direct danger from a possible fire.

PLEASE NOTE!
Comply with the regulations and safety instructions for this chapter on pages 4 – 6.

FUEL SYSTEM

FUEL FEED POINT WITH T-PIECE FROM THE FUEL SUPPLY LINE FROM THE TANK FITTING TO THE VEHICLE ENGINE



1 Fuel feed pipe from tank connection
2 Fuel return pipe to the tank connection
3 Metering pump
4 T-piece
5 Fuel filter
6 Fuel hose, 5 x 3 (di = Ø 5 mm)
7 Fuel pipe, 6 x 1 (di = Ø 4 mm)
8 Fuel pipe, 4 x 1 (di = Ø 2 mm)
9 Fuel hose, 5 x 3 (di = Ø 5 mm), approx. 50 mm long
10 Fuel hose, 3.5 x 3 (di = Ø 3.5 mm), approx. 50 mm long
11 To the engine, mechanical fuel or injection pump.

Required for Hydronic M8 biodiesel for operation with FAME only.

12 Fuel pipe blue, 6 x 1 (di = Ø 4 mm)
13 Transition piece 3,5 / 5

Possible pipe lengths

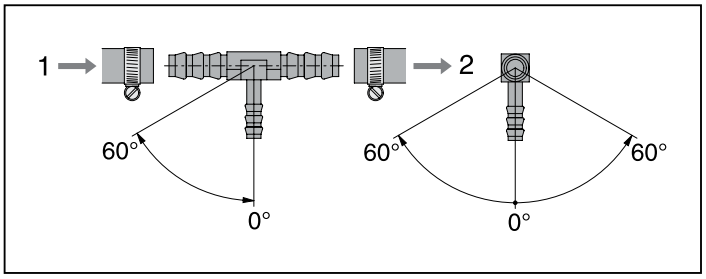
Intake side	**Pressure side**
a = max. 2 m	b = min. 1.5 m – max. 6 m

PLEASE NOTE!

- Insert the T-piece, Item (4), in the fuel flow line, upstream of the feed pump. T-piece is not included in the “Installation kit” scope of supply. For Order No. please refer to product information.
- Fuel filter, Item (5), is required for contaminated fuel only. Fuel filter is not included in the “installation kit” scope of supply. For Order No. please refer to product information.
- Items (12) and (13) are only included in the “Hydronic M8 Biodiesel” heater‘s scope of supply.

INSTALLATION POSITION OF THE T-PIECE

Use the installation positions shown in the diagram when inserting a T-piece.

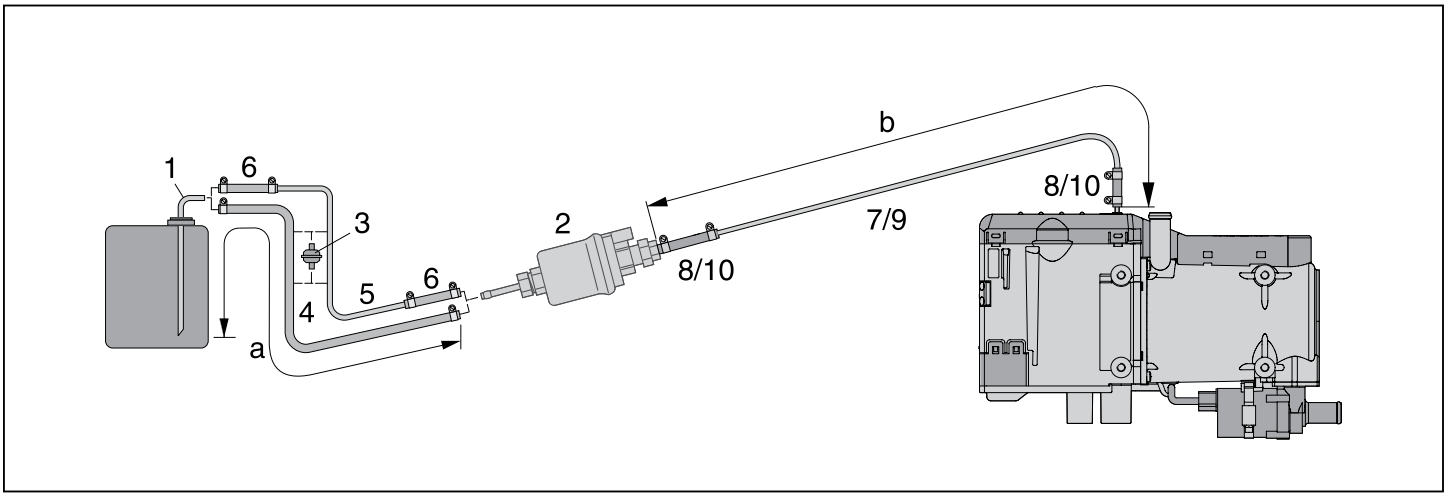


1 Direction of flow from the fuel tank
2 Direction of flow to the vehicle engine

3 Installation

FUEL SYSTEM

FUEL FEED POINT WITH TANK CONNECTION – ASCENDING PIPE, INTEGRATED IN THE VEHICLE TANK



1 Tank connection for metal tank – di = Ø 4 mm, da = Ø 6 mm
2 Metering pump
3 Fuel filter
4 Fuel hose, 5 x 3 (di = Ø5 mm)
5 Fuel pipe, 6 x 1 (di = Ø 4 mm)
6 Fuel hose, 5 x 3 (di = Ø 5 mm), approx. 50 mm long
7 Fuel pipe, 4 x 1 (di = Ø 2 mm)
8 Fuel hose, 3.5 x 3 (di = Ø 3.5 mm), approx. 50 mm long

Required for Hydronic M8 biodiesel for operation with FAME only.

9 Fuel pipe blue, 6 x 1 (di = Ø 4 mm)
10 Transition piece 3,5 / 5

Possible pipe lengths

Intake side	**Pressure side**
a = max. 2 m	b = min. 1.5 m – max. 6 m

PLEASE NOTE!

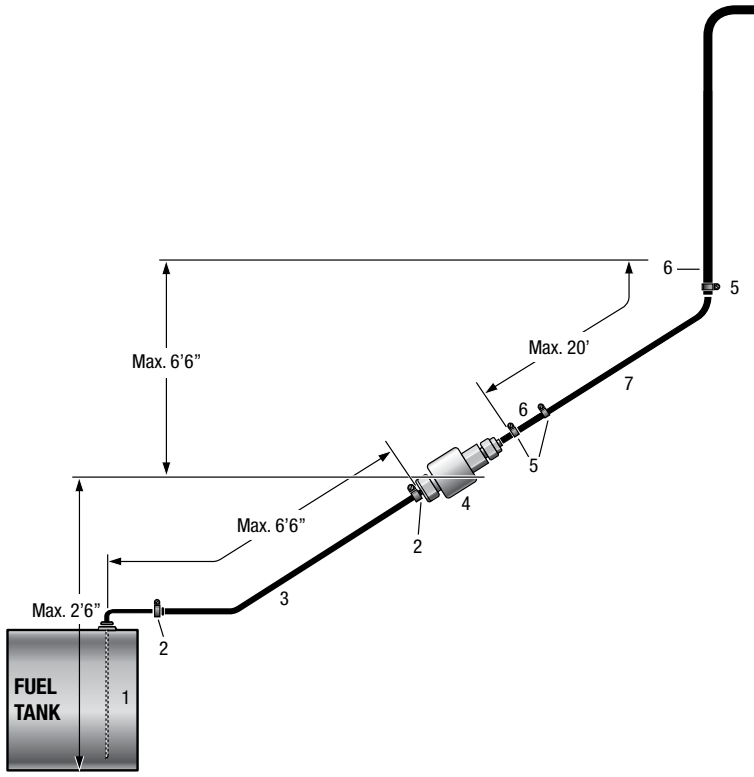
- Item (1), tank connection for metal tank, in not included in the “installation kit” scope of supply. For Order No. please refer to product information.
- Fuel filter, Item (3), is required for contaminated fuel only. Fuel filter is not included in the “installation kit” scope of supply. For Order No. please refer to product information.
- Items (9) and (10) are only included in the “Hydronic M8 Biodiesel” heater‘s scope of supply.
- When installing tank connection maintain a minimum distance of 50 ± 2 mm from the end of the riser pipe and the bottom of the tank.

⚠ DANGER!
SAFETY INSTRUCTIONS FOR THE FUEL SUPPLY!

- The fuel must not be conveyed by gravity or overpressure in the fuel tank.
- Withdrawal of fuel after the vehicle’s fuel pump is not allowed.
- When the pressure in the fuel pipe is more than 0.2 bar or there is a non-return valve in the return pipe (in the tank), a separate tank connection must be used.
- When using a T-piece in a plastic pipe, always use support sleeves in the plastic. Connect the T-piece and the plastic pipe with corresponding fuel hoses and secure with hose clips.

FUEL SYSTEM TOLERANCES

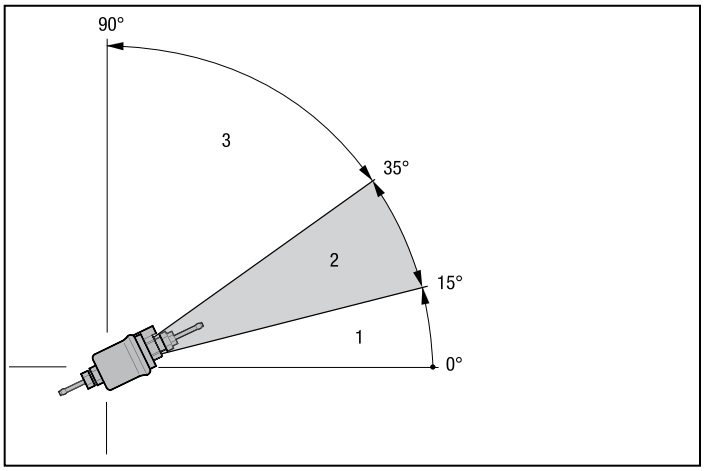
Fuel line limits must not be exceeded.
Ensure that the following conditions are met.
Bottom of the fuel metering pump must be within a height of 2'6" of the bottom of the fuel pick-up pipe.
Fuel metering pump must be within a total distance of 6'6" from the fuel pickup pipe.
Pressure runs of less than 1.3 m (50") use only 3.5mm rubber (360 75 300



1 4mm Fuel Pick-Up Pipe 4mm
2 11mm Clamp
3 5.0mm Fuel Line
4 Fuel Metering Pump
5 9mm Clamp
6 3.5mm Rubber Connector
7 2.0mm White Plastic Fuel Line
See notes if length is less than 1.3 m (50")

FUELSUPPLY
INSTALLATION POSITION OF THE METERING PUMP

Always mount the metering pump with the pressure side rising upwards.
Every installation position over 15° is allowed, although an installation position between 15° and 35° is preferable.



1 Installation position between 0° and 15° is not allowed.
2 Preferred installation position in range 15° to 35°.
3 Installation position in range 35° to 90° is allowed.

3 Installation

FUEL SYSTEM

POSSIBLE INTAKE AND PRESSURE HEIGHT OF THE METERING PUMP

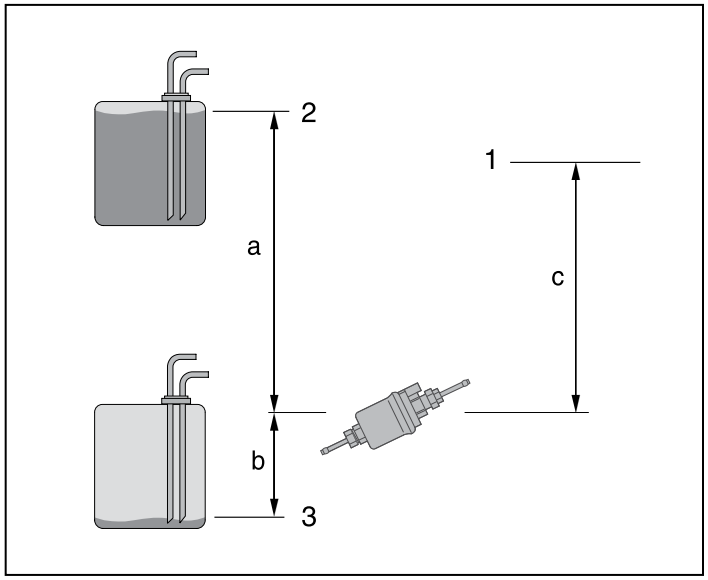
Pressure height from vehicle tank to metering pump:
a = max 1000 mm

Intake height for non-pressurised vehicle tank:
b = max. 750 mm

Intake height for a vehicle tank with withdrawal by negative pressure (valve with 0.03 bar in the tank lid):
b = max. 400 mm

Pressure height from the metering pump to the heater:
c = max. 2000 mm

PLEASE NOTE!
Check tank venting.



1 Installation position between 0° and 15° is not allowed.
2 Preferred installation position in range 15° to 35°.
3 Installation position in range 35° to 90° is allowed.

FUEL QUALITY

• Hydronic M8 Biodiesel, M10 and M12 heaters easily process standard diesel fuel to EN 590.
During the winter months the diesel fuel is adapted to low temperatures from 0 °C to –20 °C. Problems can therefore only arise if outdoor temper atures are extremely low – which also applies to the vehicle's engine – please refer to the vehicle manufacturer's regulations.

• In special cases and at outdoor temperatures above 0 °C the heater can also be run on heating oil EL according to DIN 51603.

• If the heater is run from a separate tank, please comply with the following rules:
  – If outdoor temperatures over 0 °C: Use diesel fuel according to DIN EN 590.
  – If outdoor temperatures from 0 °C to –20 °C: Use winter diesel fuel according to DIN EN 590.
  – If outdoor temperatures –20 °C to –40 °C: Use Arctic Diesel or Polar Diesel.
  – If no special diesel fuel is available for low temperatures, the kerosene or gasoline should be mixed with the fuel according to the following table:

Temperature Winter	Diesel Addition
0 °C to – 25 °C	100% –
(32 °F to – 13 °F)	100% –
–25 °C to – 40 °C	50%* 50 % paraffin or petrol
(32 °F to – 13 °F)	50%* –

* or 100 % special cold diesel fuel (Arctic diesel).

PLEASE NOTE!

• It is **not** permitted to add used oil!

• After refuelling with winter or cold diesel or the listed blends, the fuel pipes and the metering pump must be filled with the new fuel by letting the heater run for 15 mins!

OPERATION WITH BIODIESEL (FAME FOR DIESEL ENGINES ACCORDING TO DIN EN 14214)

HYDRONIC M8 BIODIESEL

The heater is approved for operation with biodiesel up to a temperature of – 8°C (17.5 °F) (the flowability reduces at temperatures below 0 °C (35°F).

PLEASE NOTE!

- When using 100 % biodiesel, the heater should be run on diesel fuel twice a year (in the middle and at the end of a heating period) to burn off possibly accumulated biodiesel deposits. To do so, let the vehicle tank run almost empty and fill with diesel fuel without adding any biodiesel.
- While running on this tank filling, switch the heater on 2 to 3 times for 30 minutes at a time at the highest temperature setting.
- If constantly operated with diesel / biodiesel mixtures of up to 50 % biodiesel, intermediate operation with pure diesel fuel is not necessary.

HYDRONIC M10 / HYDRONIC M12

Both heaters are not approved for operation with biodiesel.
Up to 10 % biodiesel may be added.

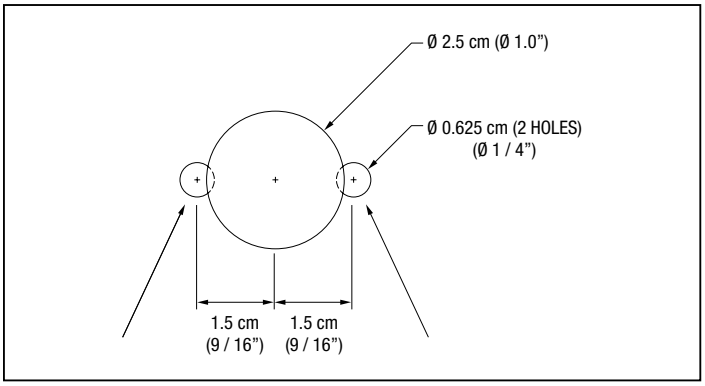
⚠ CAUTION!
SAFETY INSTRUCTIONS FOR INSTALLING THE METERING PUMP

• Always mount the metering pump with the pressure side rising upwards – minimum incline 15°.

• Protect the metering pump and filter from intolerable heat, do not mount near to the silencers and exhaust pipes.

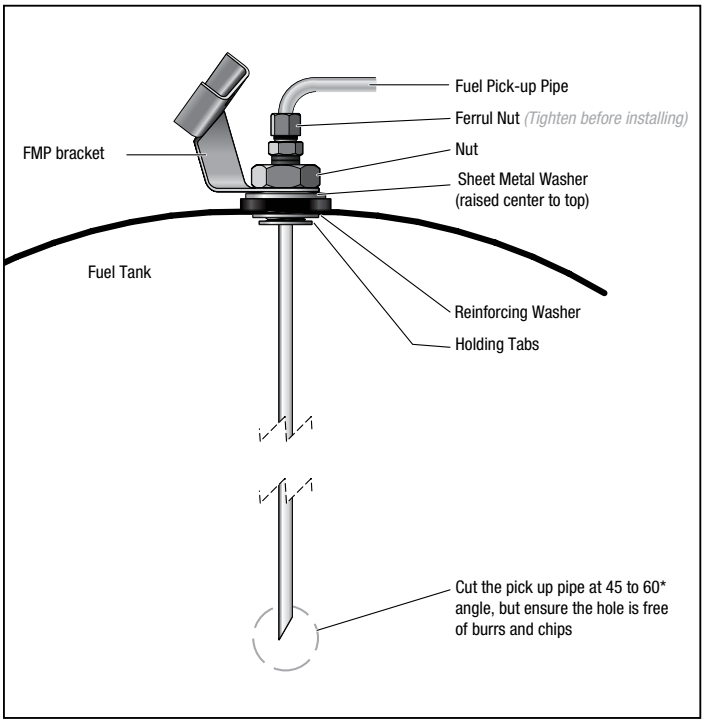
FUEL PICK-UP PIPE INSTALLATION

- Choose a protected mounting location close to the pump and heater. A spare fuel sender gauge plate provides an ideal mounting location. If one is not available.
- Drill mounting holes in tank to accommodate pick-up pipe as shown.
- Tighten Ferrule nut to pick-up pipe at desired height.
- Cut the fuel pick-up pipe to length. Allow 2-2.5” from bottom of tank.
- Mount the fuel pick-up pipe as shown.
- Lower the fuel pick-up pipe (with reinforcing washer) into the tank using the slot created by the two 0.6cm (1/4”) holes.
- Lift the assembly into position through the 2.5cm (1”) hole.
- Assemble the rubber washer, metal cup washer and nut.

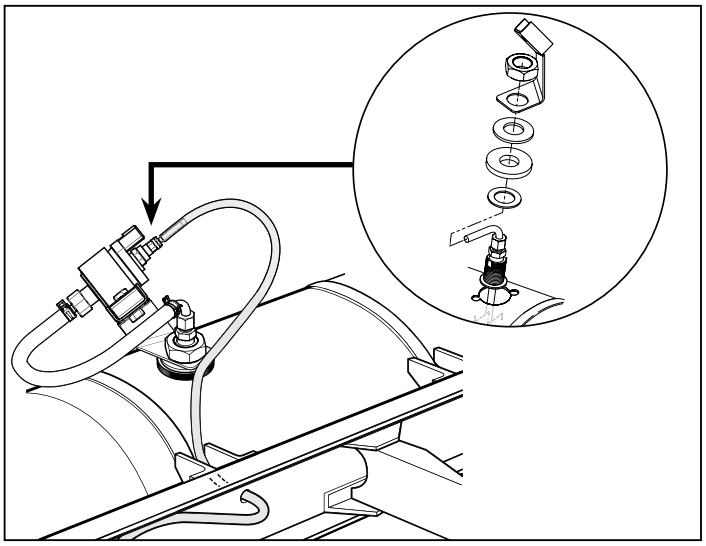


PLEASE NOTE!

Drill the two (1/4”) holes first.



- Allow 4” from Fuel Pick-up to tank bottom. Allow only 1” for flat bottom tanks.
- Always install the fuel pick up pipe on the top of the tank.
- It is recommended to keep the heater’s pick up pipe atleast 25 mm shorter than vehicle stand pipe to access clear fuel.

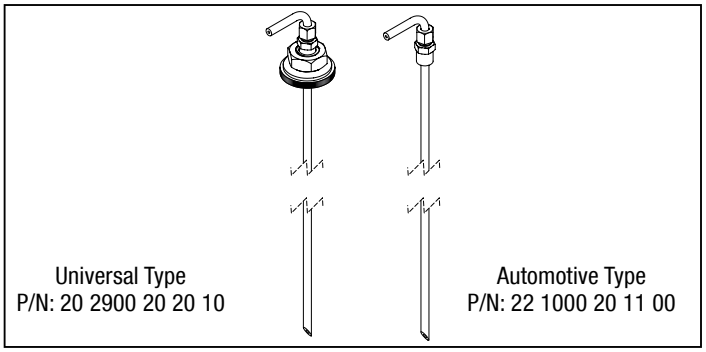


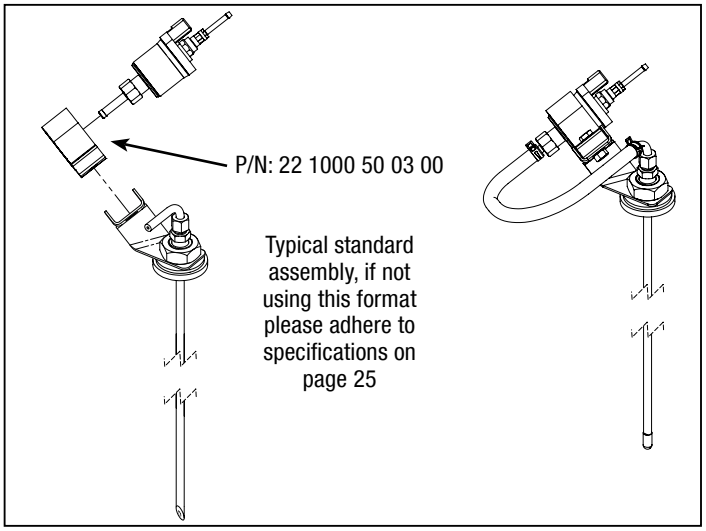
PLEASE NOTE!

- Some pick-up pipes can be installed by either drill or NPT.
- NPT fittings are available in various sizes (Refer to Eberspaecher Climate Control Systems Product Catalogue).

(OPTIONAL PICK-UP PIPE WITH NPT FITTING)

- Remove an existing plug from the top of the fuel tank.
- Cut the fuel pick-up pipe to length.
- Secure the fuel pick-up pipe into position using the combined NPT compression fitting.





3 Installation

ELECTRICAL CONNECTIONS

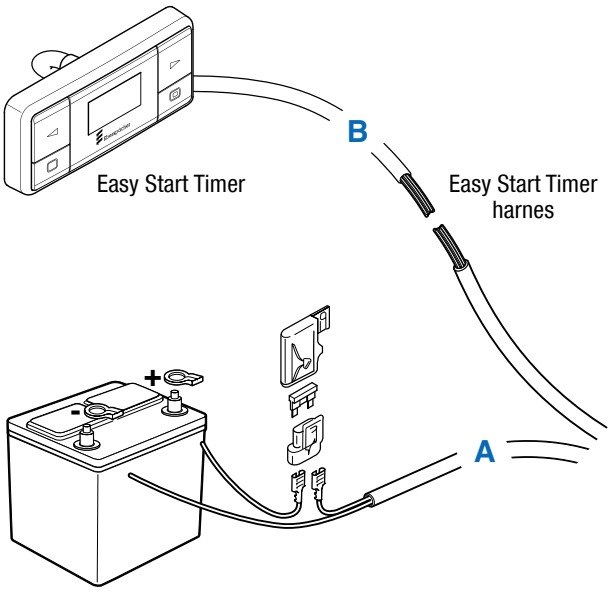
⚠ CAUTION!

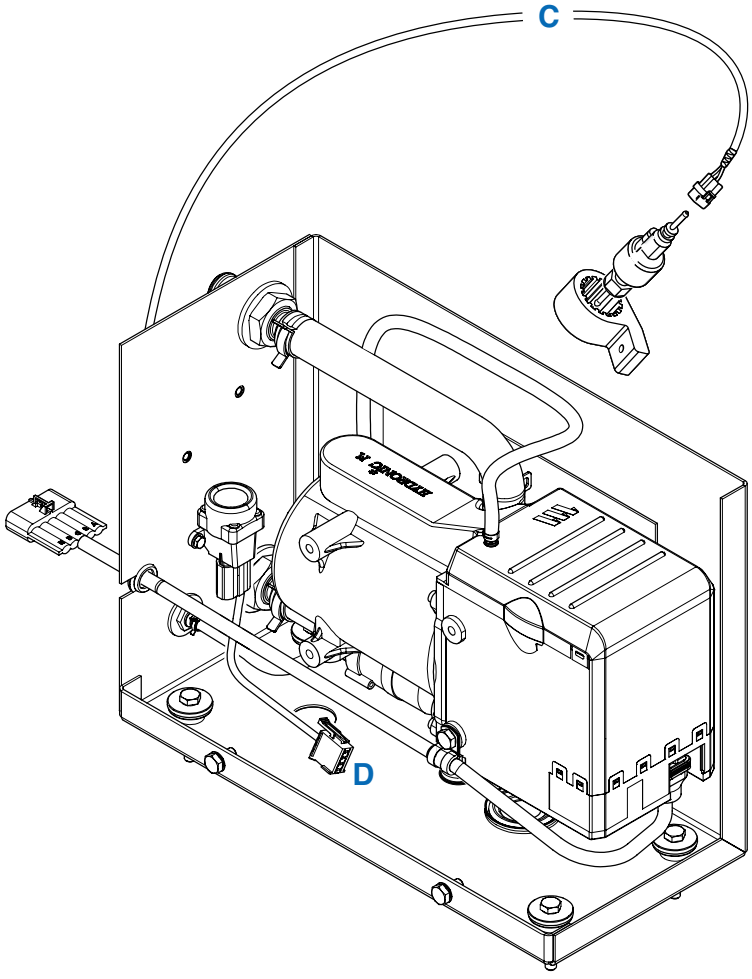
To avoid potential short circuit damage during installation, insert main fuse into the power harness after all electrical connections are complete.

PLEASE NOTE!

All harnesses should be cut to length.
All exposed electrical connections should be coated with protective dielectric grease.

A) Power Harness..... **PLEASE NOTE!** Wire must be inserted into fuse holder prior to terminating.	• 2 core harness (**red, brown**). • Connect red wire to fuse link and terminal. • Attach ring terminal to vehicle battery (+). • Connect brown wire to vehicle battery (-) using ring terminal provided. • Insert fuse. (15A-24V, 20A-12V)
B) Switch Harness.....	• 4 core harness (**red, brown, yellow, blue/white**) • Run to location of switch. Make terminal connections at switch. Eberspaecher Climate Control Systems has different available switches. See switch instructions for more information.
C) Fuel Metering Pump Harness.....	• 2 core harness (**green, green**). • Fuel Metering Pump Harness is pre-connected when box is provided with pump pre-mounted. • If mounted externally, connect wires to fuel metering pump using connector and terminals supplied, with the heater - (no polarity required).
D) Diagnostic connector.....	• 4 core harness (red, brown, yellow, blue/white).

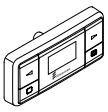




Shown is a Hydronic MII boxed version, 12 volt with Standard - Power, Switch, Fuel Metering Pump harnesses and optional EasyStart Timer.

Other timers or switch options are available.

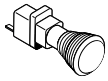
EasyStart Timer



Multi-Max Controller

Programable Timer

Push and Pull Switch



PLEASE NOTE!

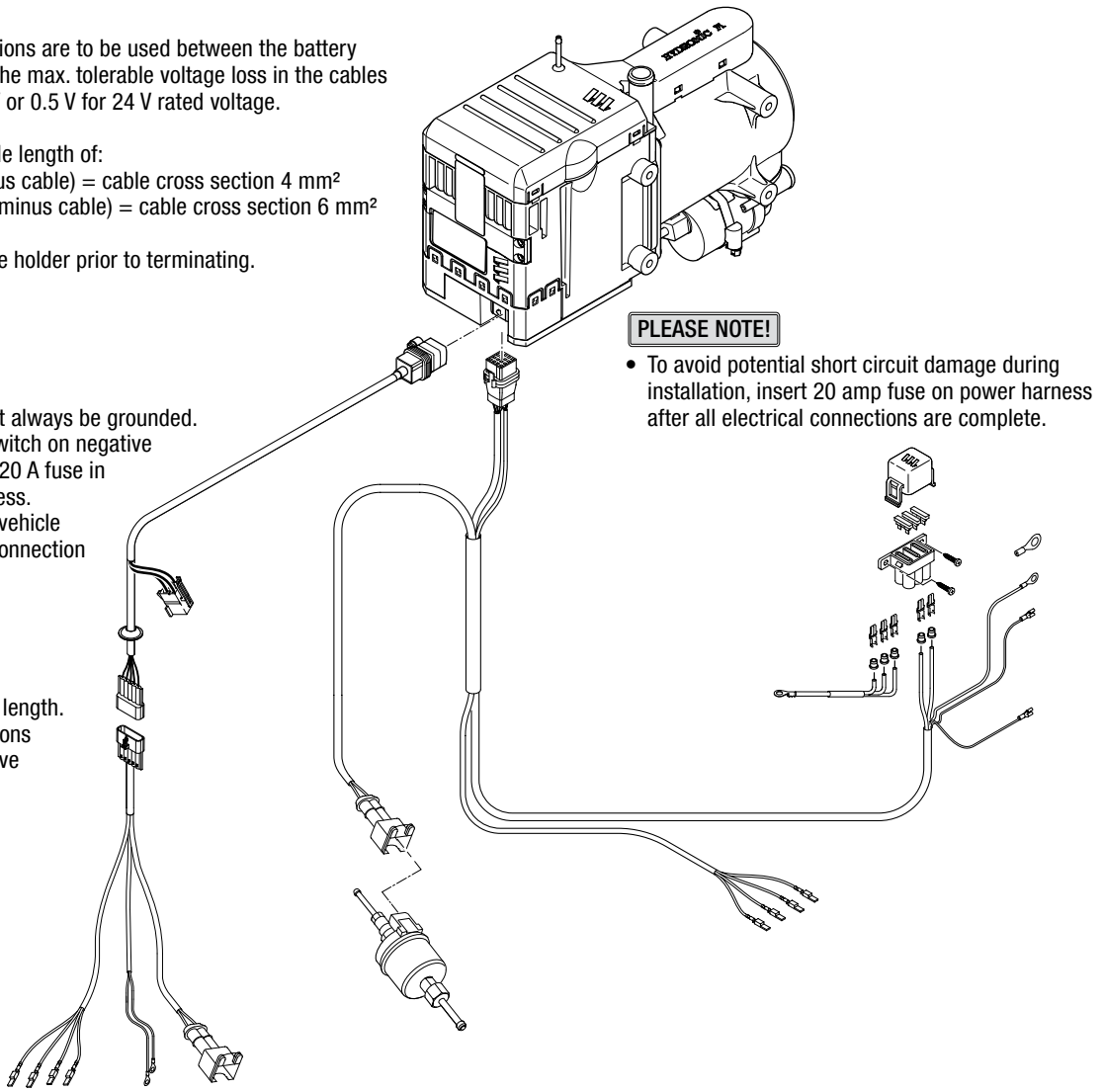
- The following cable cross sections are to be used between the battery and heater. This ensures that the max. tolerable voltage loss in the cables does not exceed 1.0 V for 12 V or 0.5 V for 24 V rated voltage.
- Cable cross sections for a cable length of:
  – up to 5 m (plus cable + minus cable) = cable cross section 4 mm²
  – from 5 to 8 m (plus cable + minus cable) = cable cross section 6 mm²
- Wire must be inserted into fuse holder prior to terminating.

PLEASE NOTE!

- Negative battery terminal must always be grounded. If a vehicle is equipped with switch on negative battery wire, install additional 20 A fuse in negative wire of heater's harness. Never run heater or any other vehicle appliances when the battery connection the ground is removed.

PLEASE NOTE!

- All harnesses should be cut to length.
- All exposed electrical connections should be coated with protective dielectric grease.



PLEASE NOTE!

- To avoid potential short circuit damage during installation, insert 20 amp fuse on power harness after all electrical connections are complete.

PLEASE NOTE! ** = Refer to the important color coding note regarding blue/white and yellow wires on page 37.

3 Installation

PUSH/PULL SWITCH

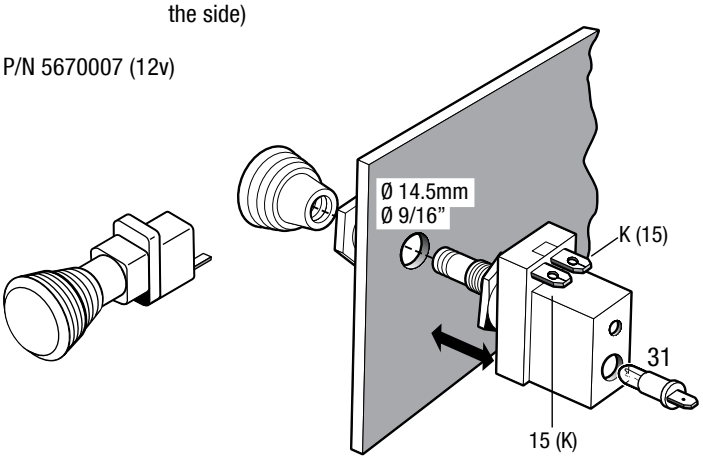
- Mount switch in a location where it is easily accessible.
- Mount using hardware supplied.
- Connect the switch harness to the connector at the heater and run the harness to the switch location.
- Cut harness to length at the switch and install terminals.
- Connect wiring as described below.

PLEASE NOTE!

Switch light glows when pulled out and is off when pushed in.

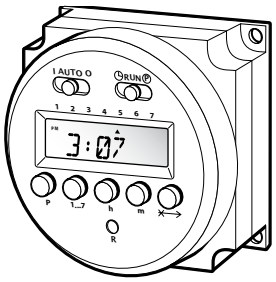
Brown- 31	Power from battery "-"
Red- K(15)	Power from battery "+"
Yellow-15(K)	Switch control to the heater
Blue/White	Diagnostic from heater (disregard - tape end and tie off to the side)

P/N 5670007 (12v)



PROGRAMMABLE TIMER

P/N 5670433 (12v)
P/N 5670434 (24v)



⚠ **IMPORTANT!** This electronic timer has a maximum loading printed on on the rating label and under no circumstances should this be exceeded.

FETURES
- Up to 8 ON and OFF switches a day/56 ON and OFF switches per week.
- Option to program individual days or 8 different weekday groups.
- Minimum switching period of one minute
- Summer/Winter time changeover
- Easy to read LCD display
- Manual Override button
- Battery Back-up

PLEASE NOTE!

As soon as you have connected 12 or 24 volts you will have to push down the RESET button and set time to activate the timer.

SETTING THE TIME

- Slide right switch to ◷ to set time.
- Press 1...7 button until arrow points to current day (1=Monday, 2=Tuesday, etc.). Press the "h" and "m" buttons to set the hours and minutes. The "PM" indicator shows noon to 11:59 p.m.
- Slide right switch to "RUN".

PROGRAMMING OF SWITCHING TIMES

The Auto Time Switch has the capacity for 8 ON/OFF switches. By using the blocks of days available, you can save program capacity. The block days are:

MO, TU, WE, TH, FR, SA, SU – Individual days of the week
MO, TU, WE, TH, FR
SA, SU
MO, TU, WE, TH, FR, SA
MO, WE, FR
TU, TH, SA
MO, TU, WE

PROGRAMMABLE TIMER INSTRUCTIONS

- To program ON or OFF time slide the right switch to Ⓟ. A " ┆ " appears in the bottom right hand.

Corner and a bulb icon is displayed indicating an ON time is ready to be programmed in memory " ┆ ".

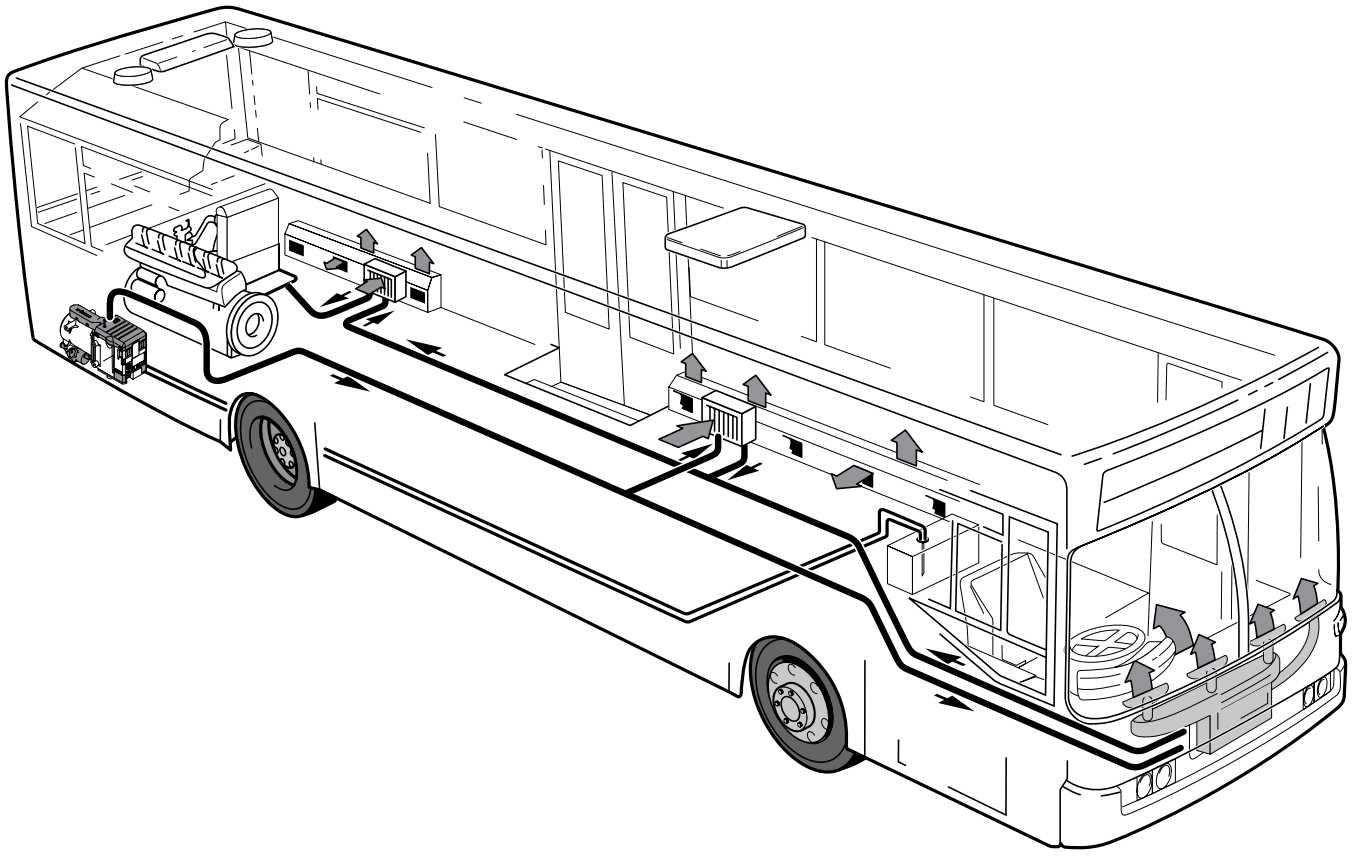
Press "P" button until desired ON or OFF time program is selected. (NOTE: Odd numbers indicate ON times and Even numbers indicate OFF times. When an OFF time is ready to be programmed there is no bulb icon present. Every cycle must have a programmed ON time and a programmed OFF time or the program will not execute.)

- Press 1...7 button until arrows point to selected day(s) you want this ON cycle to occur.
- Press "h" and "m" buttons to show switch-on time, noting the "PM" indicator.

PLEASE NOTE!

To save time you can set up each on/off cycle;
- A) To be unique for each individual day, or
- B) For Monday to Friday (days 1 to 5), or
- C) For weekends only (days 6 & 7), or
- D) For all days except Sunday (days 1 to 6) , or…
- E) The entire week at one time. This can save a lot of time when programming the "on" and "off" cycles.

E-GUARDIAN



4 Operation and Function

OPERATING INSTRUCTIONS

The heater is operated by a control unit.
The control unit is accompanied by detailed operating instructions which you will receive from the company installing the heater.

INITIAL COMMISSIONING

The following points are to be checked by the company installing the heater during initial commissioning.

- After installation of the heater, the coolant circuit and the whole fuel supply system must be vented carefully.
  Comply with the instructions issued by the vehicle manufacturer.
- Open the coolant circuit before the trial run (set the temperature control to "WARM").
- During the trial run of the heater, check all water and fuel connections for leaks and firm fitting.
- If the heater shows a fault during operation, find and eliminate the cause of the fault using a diagnosis unit (Contact JE service partner).

IMPORTANT INSTRUCTIONS FOR OPERATION

SAFETY CHECKS BEFORE STARTING

After a longer interval in operations (after the summer months) the fuse must be put in position and / or the heater connected up to the battery. Check that all parts fit firmly (tighten screws where necessary).
Check the fuel system visually for any leaks.
Refill the engine coolant.

- Bleed air from the coolant system by running the engine and refilling the antifreeze as needed. Resecure heater hose.
- Run engine to further bleed the system

Before switching on or pre-programming the heater, adjust the heating control in the vehicle to "WARM" (maximum setting) and the fan to "SLOW" (low power consumption).

In vehicles with automatic heating, adjust the heating
control to "MAX" and open the heating vents before switching the ignition off.

TEMPERATURE DROP (OPTIONAL)

The control stages are reached earlier and the heater's control action is adjusted to the lower heat requirement.
It is possible to lower the temperature by connecting a plus signal to the 12-pin connector B2, PIN C3, if necessary by integrating an ON-OFF switch.
The switch-on temperature (40 °C) and switch-off temperature (55 °C) of the cooling water for switching on or off the vehicle fan are lowered by 10 °C.

HEATING MODE AT HIGH ALTITUDES – UP TO 3500 M ASL

The combustion behaviour of the heater changes with increasing altitude, due to the lower air density.
The heater has an automatic altitude detection device which it uses to automatically
compensate for the change in air density, i.e. the combustion ratio
between fuel and air is adapted to the ambient conditions by reducing the fuel quantity.

PLEASE NOTE!

- The usual switching limit for altitude detection lies between 1000 m asl and 2000 m asl and solely depends on the local climatic conditions.
- The maximum heating output of the Hydronic M10 / M12 in "Altitude Mode" is 8.5 kW.
- The Hydronic M8 Biodiesel does not have an altitude detection device. Unrestricted heating mode is possible up to 1500 m asl.
- Heaters suitable for high altitudes have "H Kit" marked on the side of the nameplate.

DESCRIPTION OF FUNCTIONS

SWITCHING ON

On being switched on, the switch-on check is displayed in the control unit.
The heater starts, whereby the water pump and the combustion air blower start up first.
The glow phase of the glow pin begins simultaneously with distribution of the combustion air.
The metering pump starts fuel feed somewhat delayed.
The glow pen are switched off if a stable flame has formed in the combustion chamber.

PLEASE NOTE!

If the heater fails to start the first time it will automatically attempt a second start. If unsuccessful the heater will shut down completely.

PLEASE NOTE!

On initial start up the heater may require several start attempts to self prime the fuel system.

HEATING MODE

After starting, the heater runs with "POWER" stage until the water temperature exceeds the "POWER" / "HIGH" changeover threshold.

HYDRONIC M8 BIODIESEL / M10
Then, depending on the heat requirement, the heater switches to the "HIgH – MEDIUM – LOW – OFF" stages.

HYDRONIC M12
Then, depending on the heat requirement, the heater switches to the "HIgH – MEDIUM 1 / MEDIUM 2 / MEDIUM 3 – LOW – OFF" stages.
If the heating requirement in the "LOW" stage is so small that the cooling water temperature reaches 86 °C, the heater switches from "LOW" to "OFF".
An after-run of approx. 180 seconds follows.
The water pump remains active until the controlled start.
If the cooling water has cooled to approx. 72 °C, the Hydronic M8 / M10 heater starts in "MEDIUM" stage, the Hydronic M12 heater starts in "MEDIUM 1" stage. If the cooling water temperature reaches 55 °C, the vehicle fan switches on; if the temperature drops to 40 °C, the vehicle fan switches back off again.

SWITCHING OFF

After switching off, the heater briefly switches to “LOW” stage to reduce emissions and smoke formation.
This process can take up to 40 seconds maximum if the fuel quantity is constantly reduced.
Once this process has finished the heater starts the after-run for 180 seconds.
During the after-run both glow pins are switched on alternately.

PLEASE NOTE!

In independent heater mode (vehicle engine and heater are switched on), always ensure that the heater is completely switched off before entering a petrol station area.

CONTROL AND SAFETY DEVICES

The heater is equipped with the following control and safety devices:

- If the heater does not ignite within 74 seconds after starting the fuel pump, the start is repeated. If the heater still does not ignite after another 65 seconds, the heater is switched off.*
  After an unacceptable number of failed start attempts, the controller is locked.**
- If the flame goes off by itself during operation, the heater is restarted. If the heater does not ignite within 74 seconds after the fuel pump has started again, the heater is switched off.*
  After an unacceptable number of failed start attempts, the controller is locked.**
- In the case of overheating (e.g. lack of water, poorly vented coolant circuit), the overheating sensor triggers, the fuel supply is interrupted and the heater switched off.*
  Once the cause of overheating has been eliminated, the heater can be restarted by switching off and on again (on condition that the heater has cooled down again sufficiently, cooling water temperature <72 °C).
  After the heater has been switched off for overheating an unacceptable number of times, the controller is locked.**
- If the water temperature is +50 °C or higher, the heater can also switch to control stage OFF if the water throughput rate is too low. An afterrun of approx. 180 seconds follows.
- The heater is switched off if the upper or lower voltage limit is reached.*
- The heater does not start up if the electric cable to the metering pump is interrupted.
- If one of the two glow pins is defective the start sequence takes place with one glow pin only.
- The speed of the fan motor is monitored continuously.
  If the blower motor does not start up if it is blocked, or if the speed differs by > 12.5 % from the desired speed a safety lockout (shutdown on faults) takes place after 60 sec.*
- The water pump‘s function is continuously monitored.

* This status can be remedied by briefly switching off and on again.

** For details of how to cancel the lock and to read out errors, refer to the Troubleshooting and Repair instructions of the heater.

*** The ECU can be unlocked and the fault can be displayed with:
— EasyStart.
— Diagnostics Unit.
— EDiTH diagnostics software.

For operation and fault list, please refer to the enclosed operating instructions or these troubleshooting and repair instructions.

PLEASE NOTE!

Do not switch the heater off and on again more than twice.

FORCED SHUT- DOWN FOR ADR OPERATION

In vehicles for the transport of dangerous goods (e.g. tanker trucks), the heater must be switched off before the truck drives into a danger area (refinery, fuel service station, etc.)

Failure to comply results in the heater switching off automatically when:
- The vehicle engine is switched off.
- An additional unit is started up (e.g. auxiliary drive for unloading pump etc.).

The fan then runs on for max. 40 seconds.

EMERGENCY SHUTDOWN – EMERGENCY OFF

If an emergency shutdown – EMERGENCY OFF – is necessary during operation, proceed as follows:
- **Switch the heater off with the controlor**
- **Pull the fuse out or**
- **Disconnect the heater from the battery.**

⚠ WARNING!

The heater must be switched off while any fuel tank on the vehicle is being filled.
The heater must not be operated in garages or enclosed areas.

5 Electrical System

HEATER WIRING

The heater is to be connected up electrically according to the EMC directives.

⚠ CAUTION!
SAFETY INSTRUCTION FOR WIRING THE HEATER

EMC can be affected if the heater is not connected up correctly. For this reason, comply with the following instructions:

- Ensure that the insulation of electrical cables is not damaged. Avoid: chafing, kinking, jamming or exposure to heat.
- In waterproof connectors, seal any connector chambers not in use with filler plugs to ensure they are dirtand water-proof.
- Electrical connections and ground connections must be free of corrosion and firmly connected.
- Lubricate connections and ground connections outside the heater interior with dielectric grease.

PLEASE NOTE!

Comply with the following when wiring the heater and the control element:

- Electrical leads, switchgear and controllers must be arranged in the vehicle so that they can function perfectly under normal operating conditions (e.g.heat exposure, moisture etc.).

- The following cable cross sections are to be used between the battery and heater. This ensures that the max. tolerable voltage loss in the cables does not exceed 1.0 V for 12 V or 0.5 V for 24 V rated voltage.
  Cable cross sections for a cable length of:
  – up to 5 m (plus cable + minus cable) = cable cross section 4 mm² (10 AWG)
  – from 5 to 8 m (plus cable + minus cable) = cable cross section 6 mm² (8 AWG)
  Connection of the cables (plus cable and minus cable) to connector B2 requires a reduction in the cable cross-section to 2.5 mm².

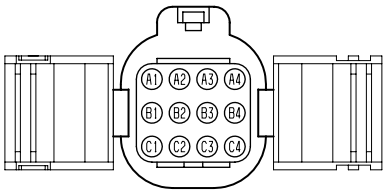
- If the plus cable is to be connected to the fuse box (e.g. terminal 30), the vehicle cable from the battery to the fuse box must be included in rating the overall cable length and possibly re-dimensioned if necessary.

- Insulate unused cable ends.

NOTES ON REWIRING THE 12-PIN CABLE HARNESS CONNECTOR

If, on replacing the Hydronic M (Hydronic 10) with the Hydronic M-II, the cable harness already installed in the vehicle is to be reused it is necessary to remove the 12-pin connector using the AMP release tool and to rewire it according to the following table (AMP Order No. 1-1579007-4).

12-PIN CONNECTION PIN ASSIGNMENT



Connector is shown from the cable entry side.

Cable harness HYDRONIC M		Rewiring 12-pin connector	
Connection	Cross-section Cable colour	HYDRONIC M PIN	HYDRONIC M-II PIN
Metering pump	green	C 4 →	A1
Terminal (-)	brown	C 3 →	A2
Terminal (+)	red	C 2 →	A3
Plus signal main battery switch	white / red	C 1 →	A4
Plus signal Solenoid valve relay	–	B 4 →	B1
Diagnosis	blue	B 3 →	B4
Plus signal ADR auxiliary drive	violet	B 2 →	B3
Third party control Water pump	–	B 1 →	B2 remains unused**
Blower relay	red / yellow	A 4 →	C1
D+ for ADR operation	violet / green	A 3 →	C2
Temperature drop	–	A 2 →	C3
Heater ON	yellow	A 1 →	C4

* Connection of the cables to connector B2 requires a reduction in the cable cross-section to 2.5 mm²..
** External control of the water pump is not planned for Hydronic M-II.

PARTS LIST FOR WIRING DIAGRAM, HYDRONIC M-II – 12VOLT / 24VOLT

1.1 Blower motor
1.2 Glow pin I
1.2.1 Glow pin II (optional 12 kW)
1.5 Overheating sensor
1.12 Flame sensor
1.13 Temperature sensor
2.1 Control unit
2.2 Fuel metering pump
2.5.7 Relay, vehicle blower (fan)
2.5.18 Relay, changeover water circuit
(To be fitted by customer if required)
2.7 Main fuse 12 volt = 20A
24 volt = 15A
2.7.1 Fuse, control option 5A
2.7.5 Fuse, vehicle blower (fan) 25A
2.12 Water pump
5.1 Battery
5.10 Vehicle blower (fan)

a) Connection to programmable timer, easy start or push pull switch
b) Water circuit change-over: Relay makes contact at 68 °C and breaks contact at 63 °C water temperature (with temperature drop 58 °C / 45 °C)
c) Temperature drop
x) Disconnect cable
a3) Diagnosis
a3) Switch on signal
a4) Power supply plus
a5) Power supply minus

Connectors and bush holdings are shown from the cable inlet side.

CONNECTOR PIN ASSIGNMENT: 12-PIN CONNECTOR (EXTERNAL)

PIN-No.	Connection
A1	Dosing pump
B1	Solenoid valve, optional
C1	Relay, blower
A2	Battery (-)
A3	Battery (+)
B3	TRS signal (ADR)
C3	Temperature drop
B4	Diagnosis
C4	Heater ON

— Diagnostics Unit.
— EDiTH diagnostics software.
For operation and fault list, please refer to the enclosed operating instructions or these troubleshooting and repair instructions.

PLEASE NOTE!
Do not switch the heater off and on again more than twice.

FORCED SHUT-DOWN FOR ADR OPERATION

In vehicles for the transport of dangerous goods (e.g. tanker trucks), the heater must be switched off before the truck drives into a danger area (refinery,fuel service station, etc.)
Failure to comply results in the heater switching off automatically when:
- The vehicle engine is switched off.
- An additional unit is started up (e.g. auxiliary drive for unloading pump etc.).

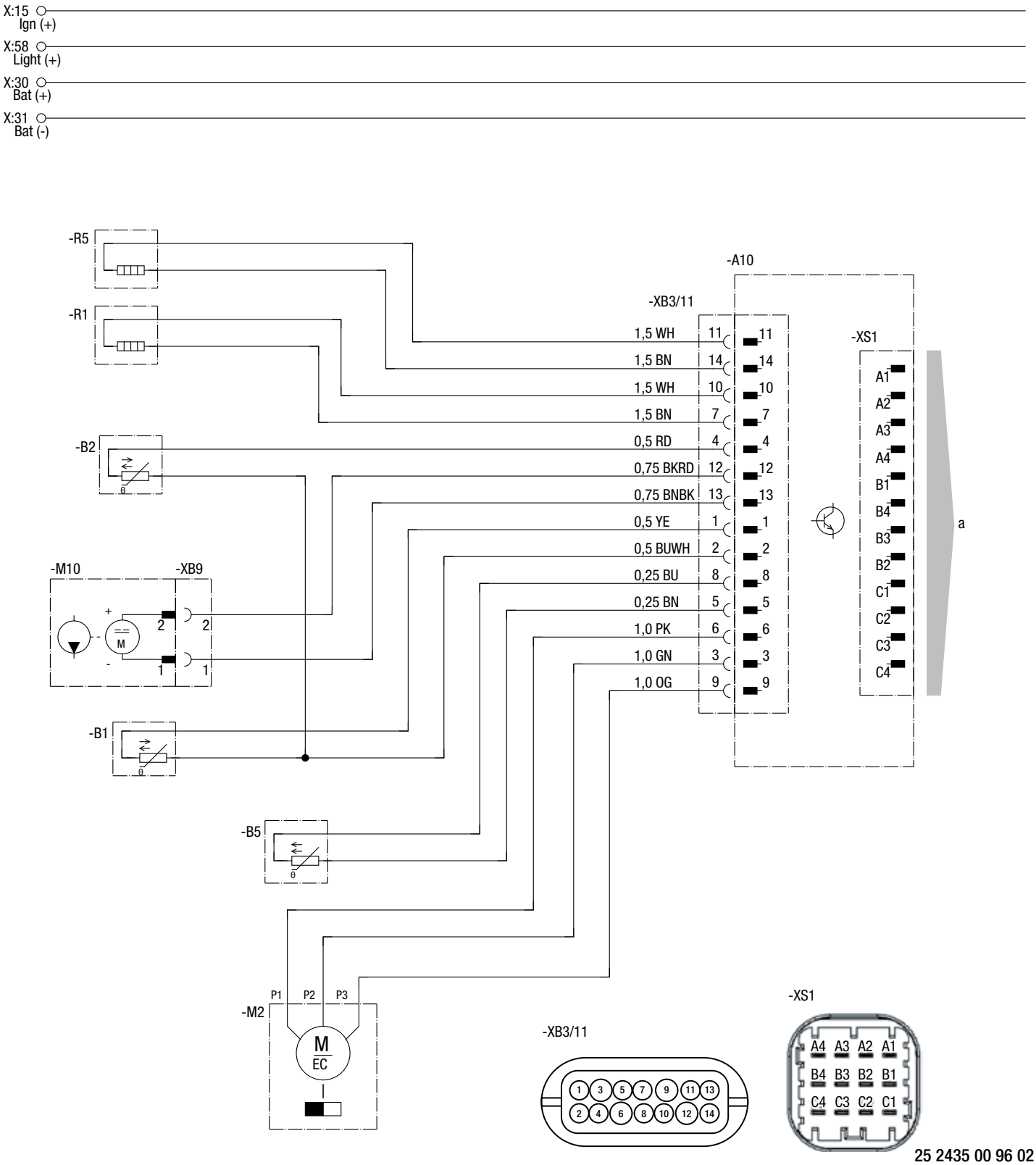
The fan then runs on for max. 40 seconds.

EMERGENCY SHUT-DOWN – EMERGENCY OFF

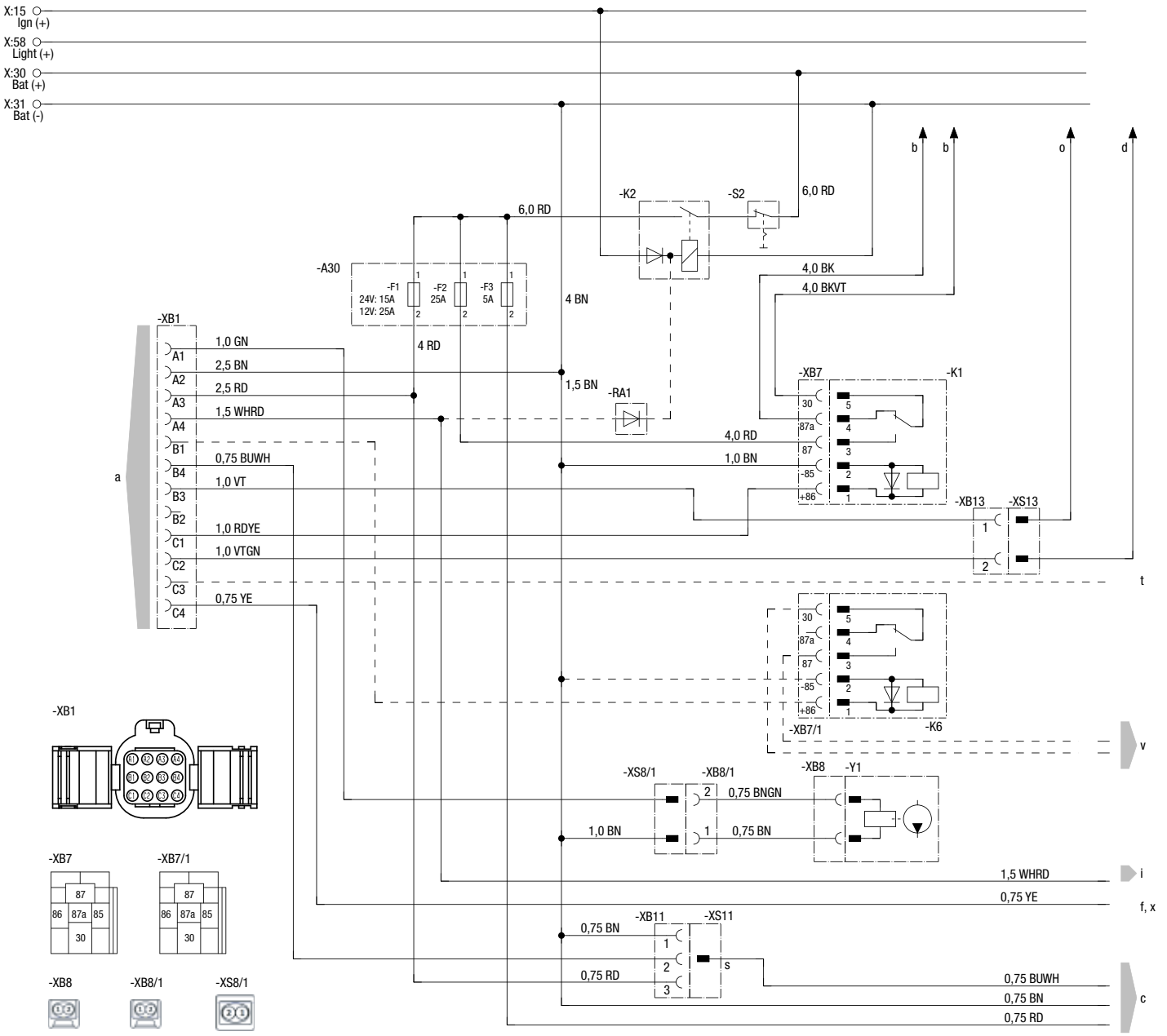
If an emergency shutdown – EMERGENCY OFF – is necessary during operation, proceed as follows:
- **Switch the heater off with the controlor**
- **Pull the fuse out or**
- **Disconnect the heater from the battery.**

⚠ **WARNING!**
The heater must be switched off while any fuel tank on the vehicle is being filled.
The heater must not be operated in garages or enclosed areas.

Heater circuit diagram – 12 Volt / 24 Volt / ADR

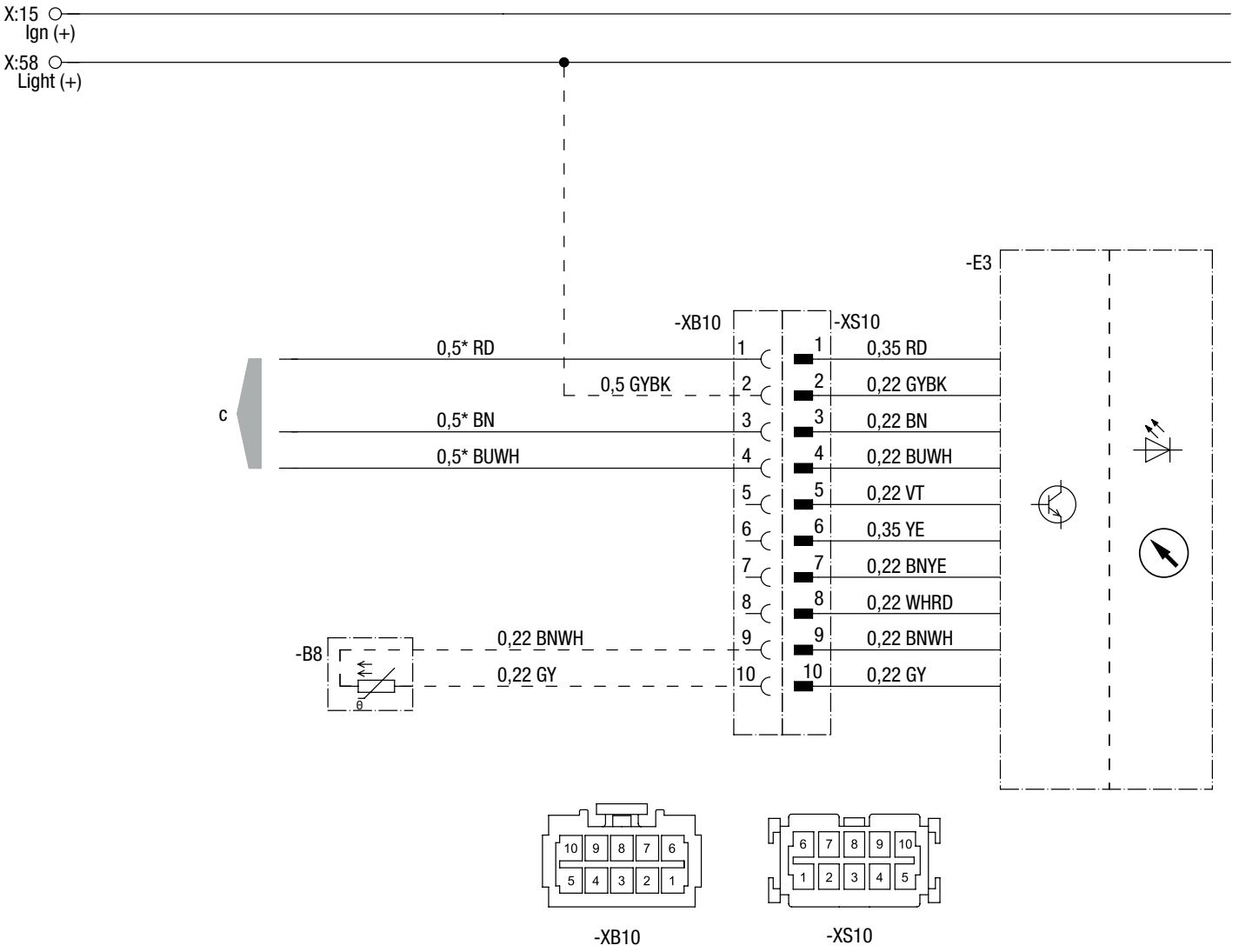


Cable harness circuit diagram – 12 Volt / 24 Volt / ADR



25 2435 00 96 03

Circuit diagram – EasyStart Timer

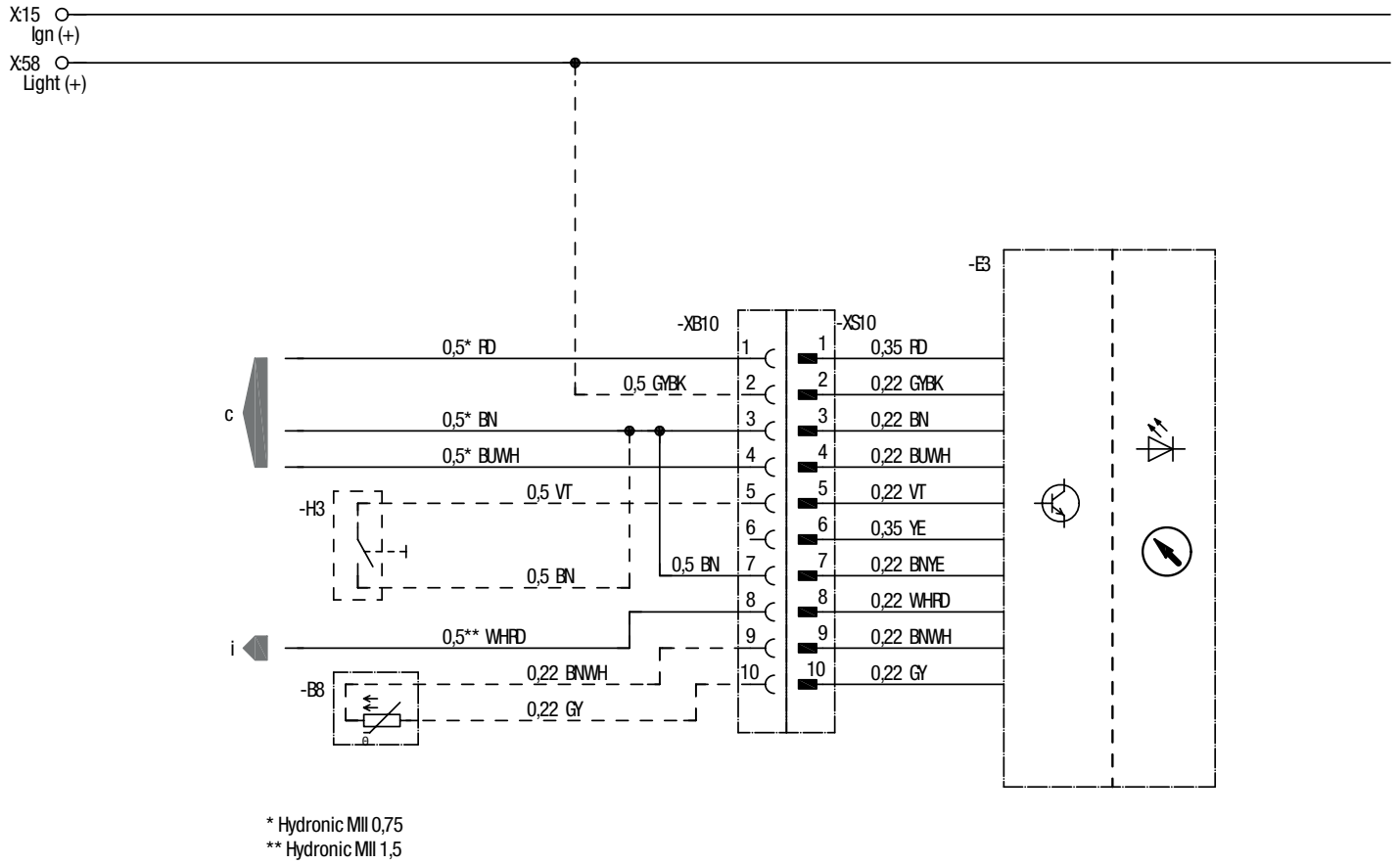


22 1000 34 97 01

-B8 Room temperature sensor (optional)
-E3 EasyStart Timer
c to the cable harness

Connectors and bush housings are shown from the cable inlet side.

Circuit diagram – EasyStart Timer-ADR



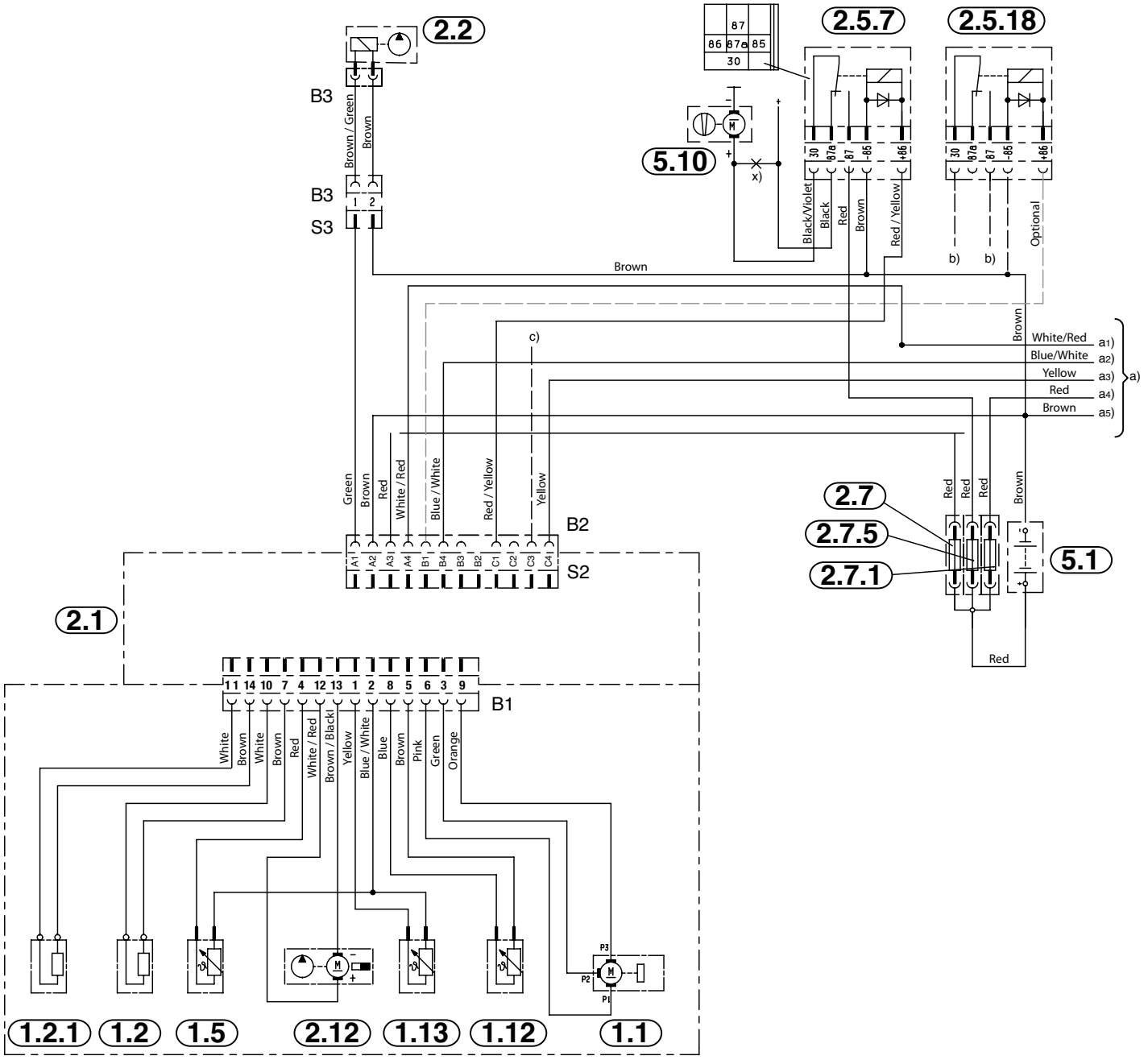
* Hydronic MII 0,75
** Hydronic MII 1,5

22 1000 34 97 10

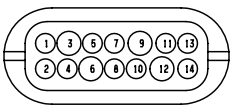
-B8 Room temperature sensor (optional)
-E3 EasyStart Timer
-H3 EasyStart Timer button
c to the cable harness
i ADR feedback from the heater

Connectors and bush housings are shown from the cable inlet side.

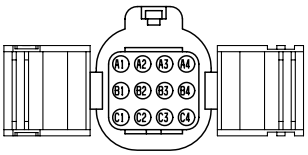
HYDRONIC M-II, WIRING DIAGRAM – 12 / 24 VOLT



B1



B2

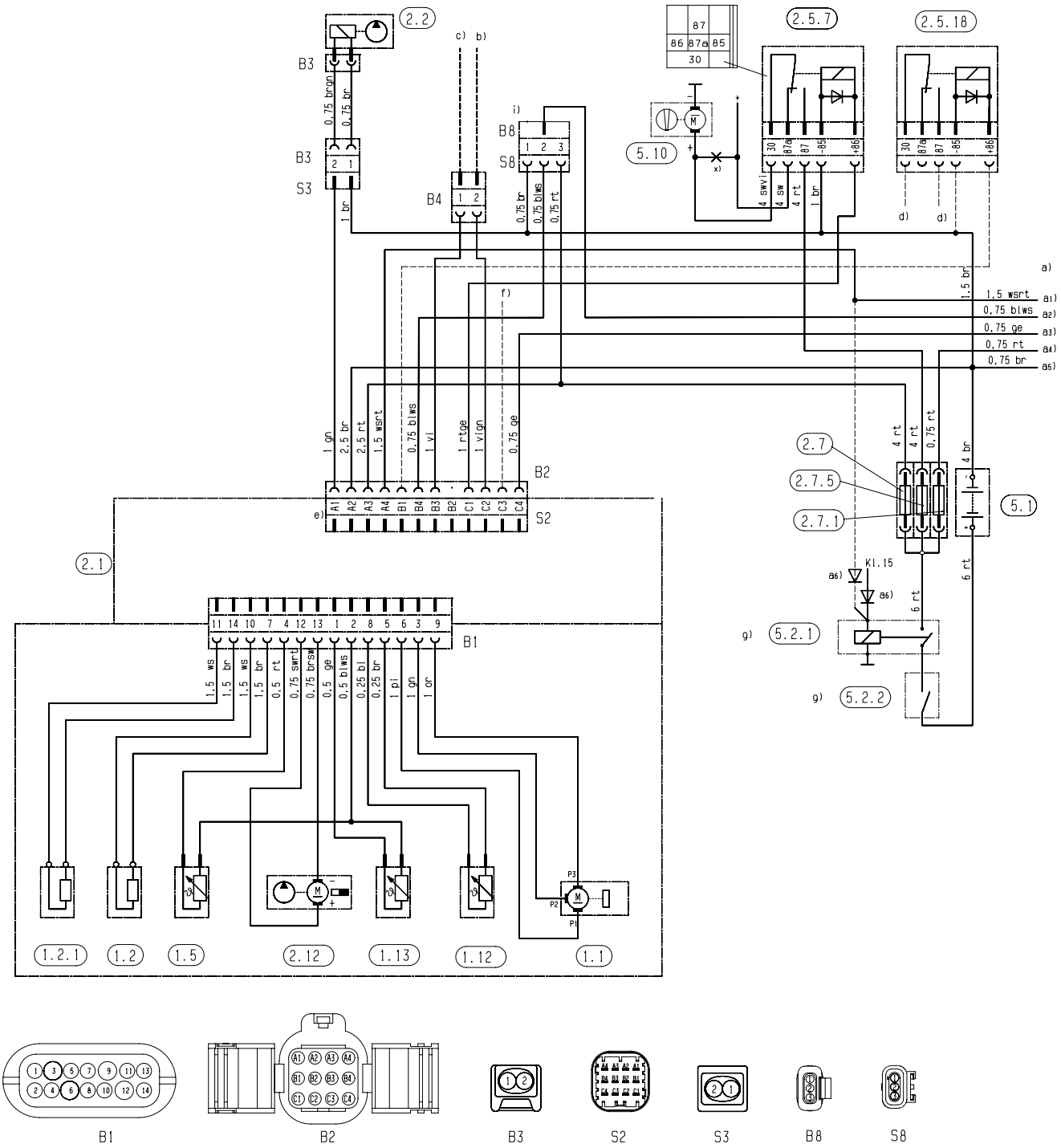


B3

S2

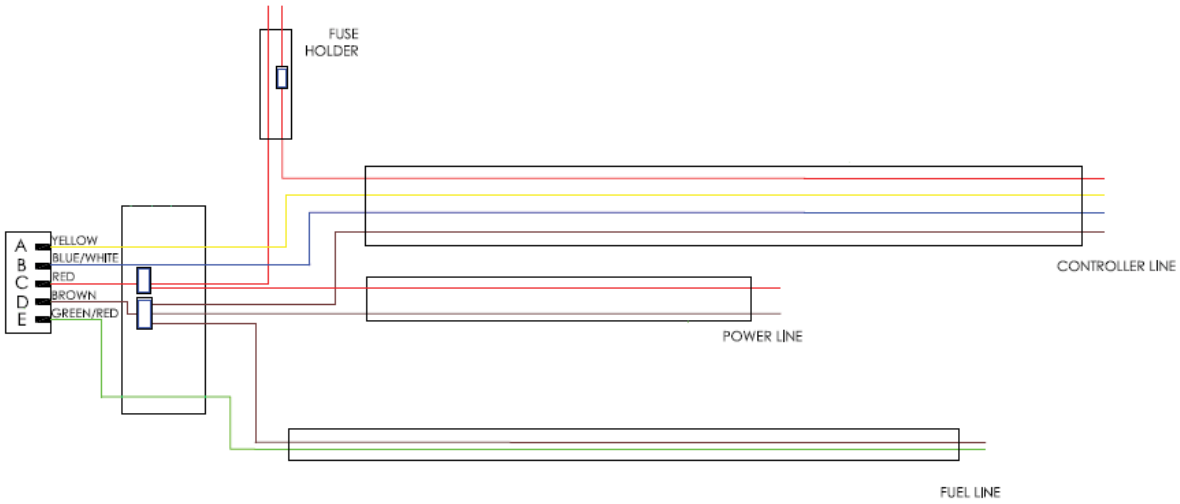
S3

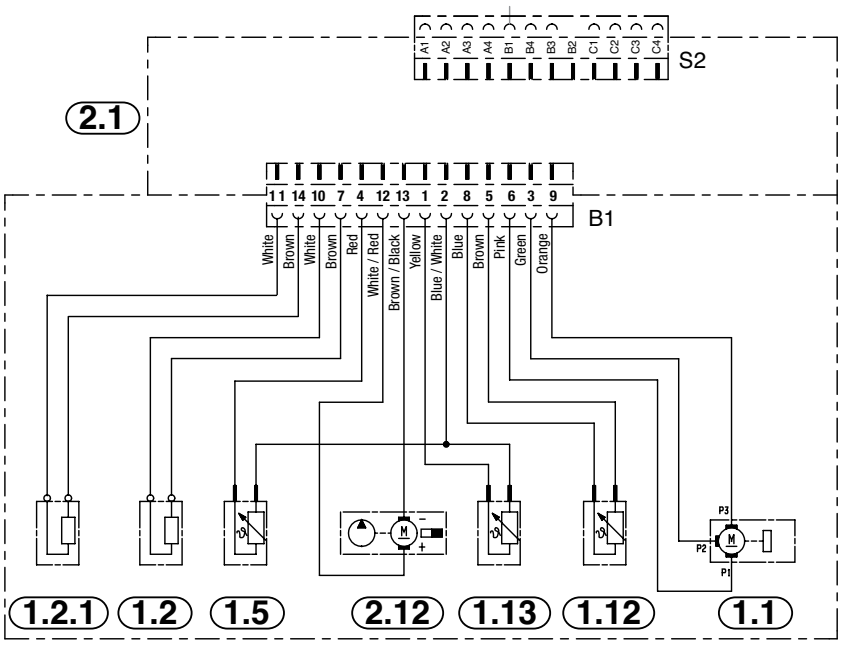
CIRCUIT DIAGRAM, HYDRONIC M-II, 24 VOLT, NORMAL AND ADR VERSION

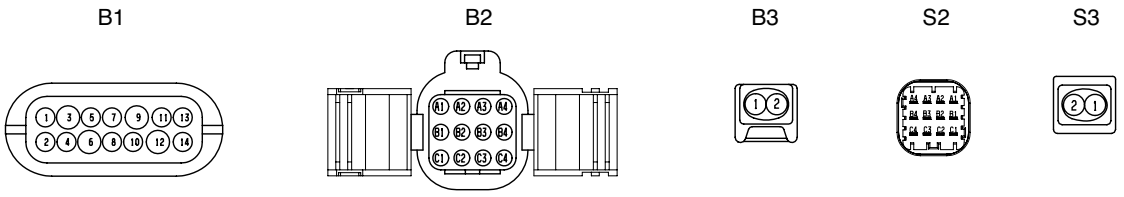


25 2435 00 96 02 C

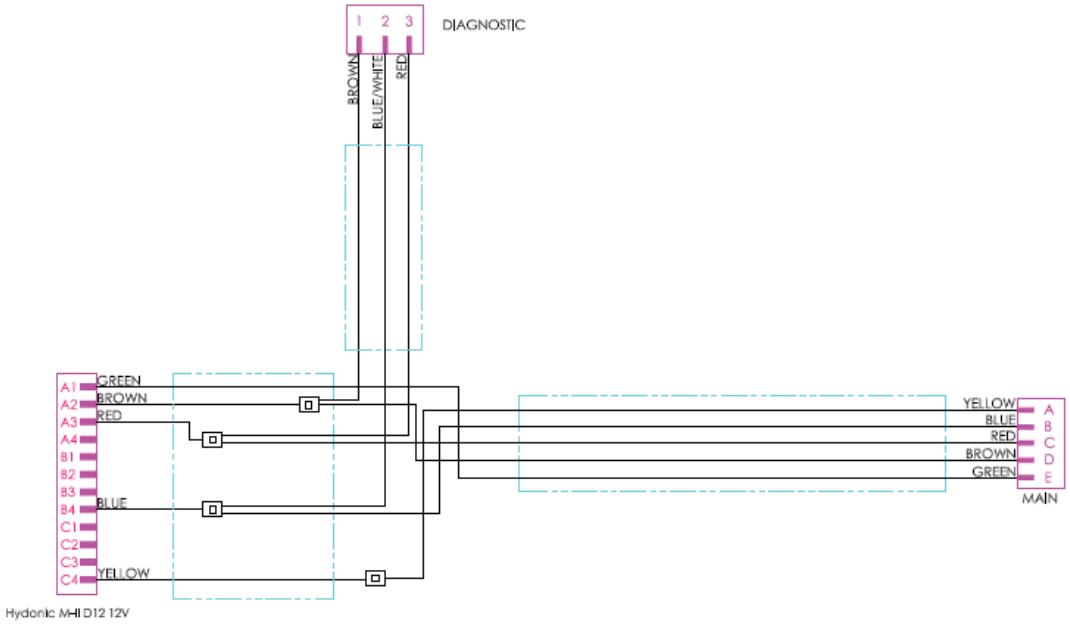
HYDRONIC M-II, WIRING DIAGRAM – 12 / 24 VOLT
P/N: 25 2800 70 0002 – Outside Harness – Hydronic M-II Series

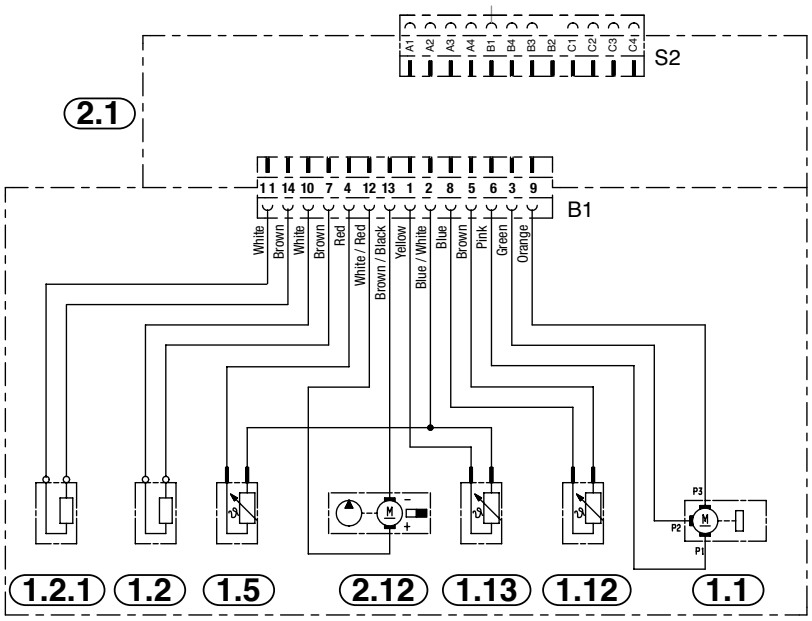


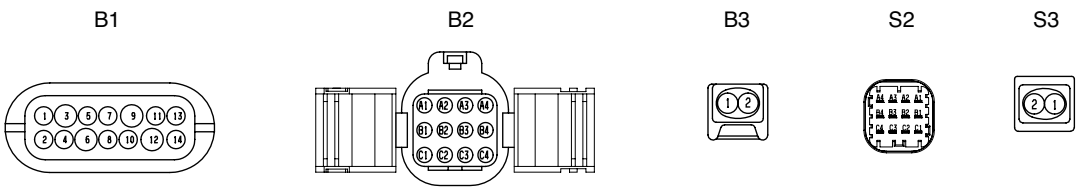




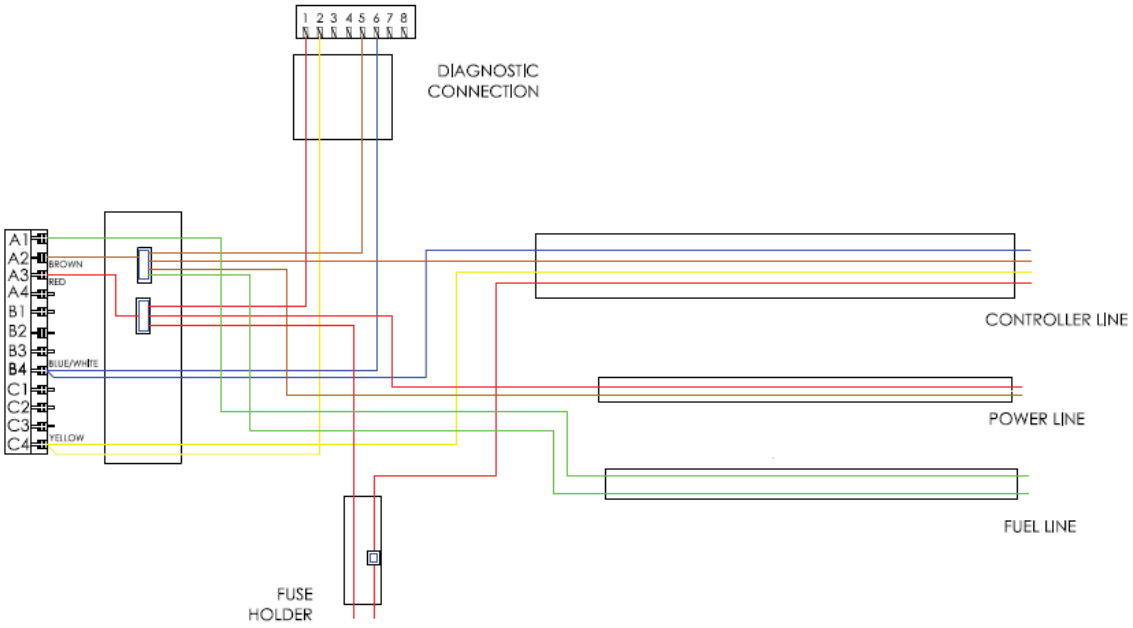
HYDRONIC M-II, WIRING DIAGRAM – 12 / 24 VOLT
P/N: 25 2800 70 1002 – Heater Harness – Hydronic M-II Series

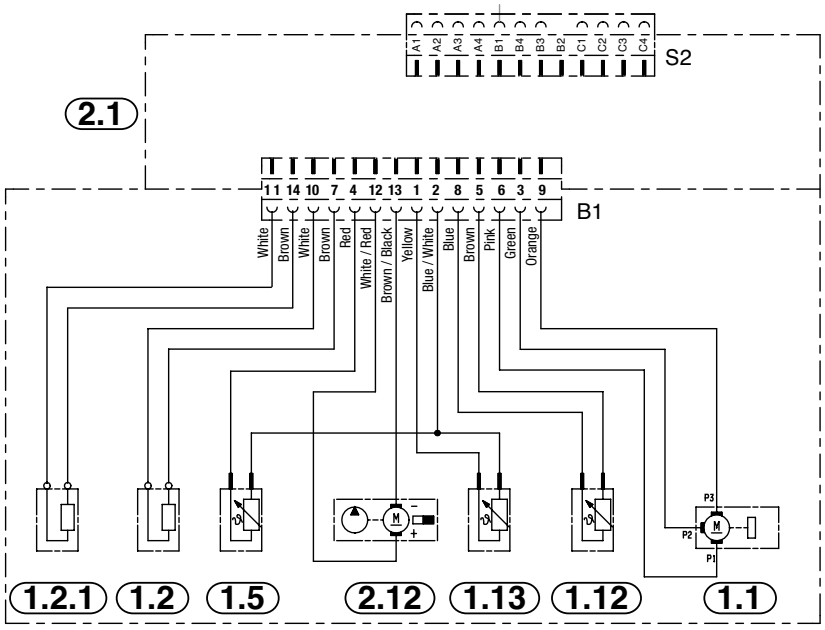


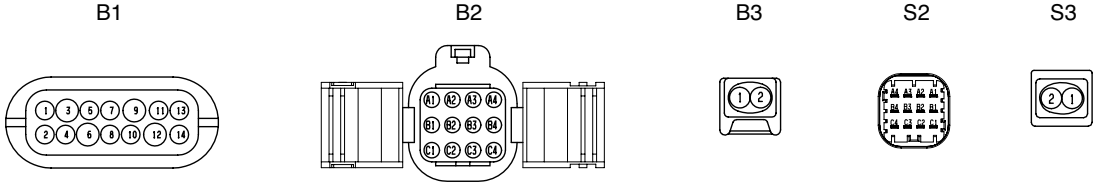




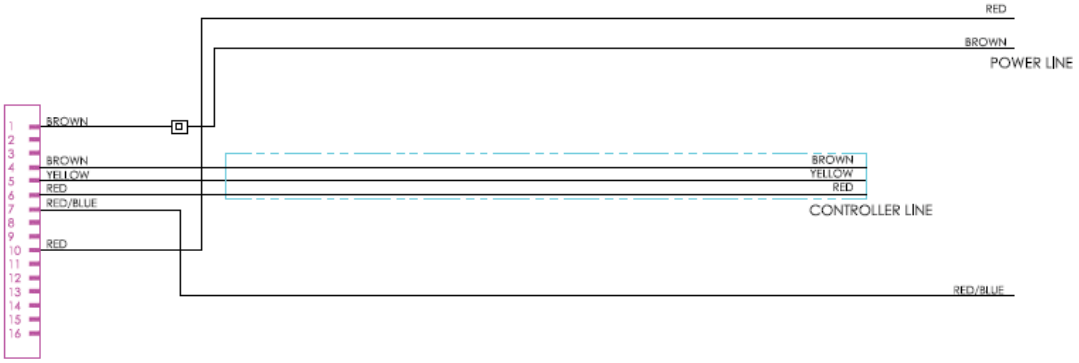
HYDRONIC M-II, WIRING DIAGRAM – 12 / 24 VOLT
P/N: 25 2800 70 1012 – Harness M-Series – Universal

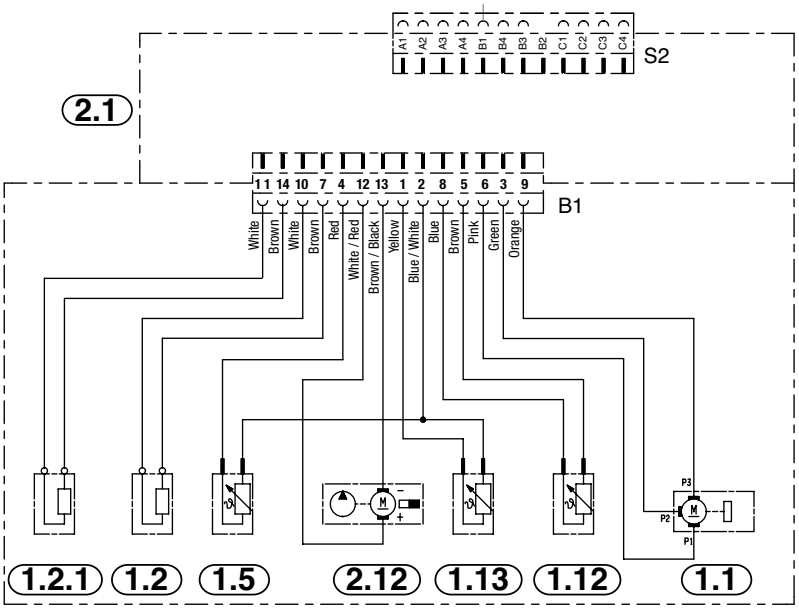


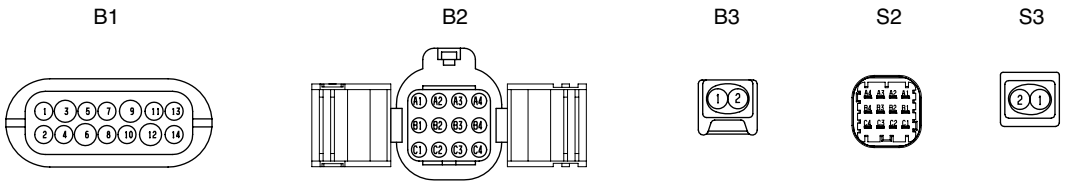




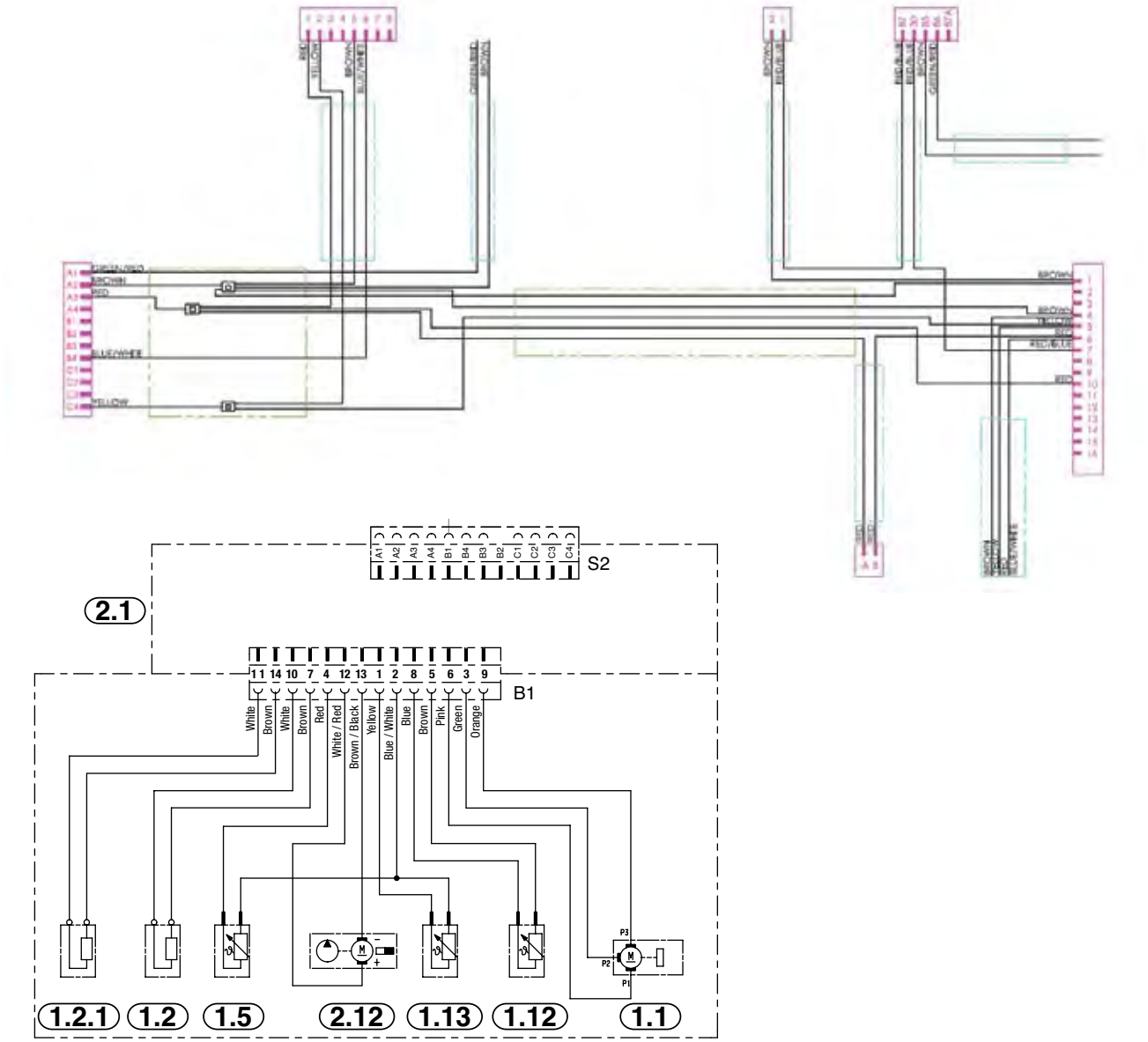
HYDRONIC M-II, WIRING DIAGRAM – 12 / 24 VOLT
P/N: 25 2800 70 1014 – L-II Boxed Outside Harness Hydronic 16-35

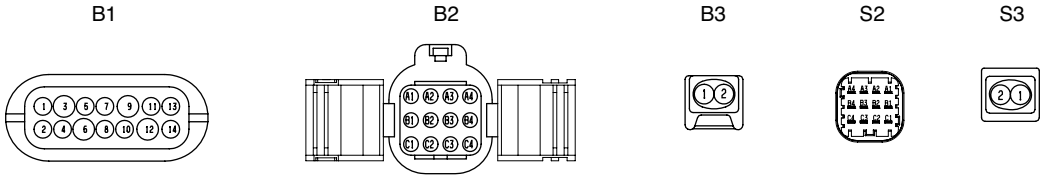




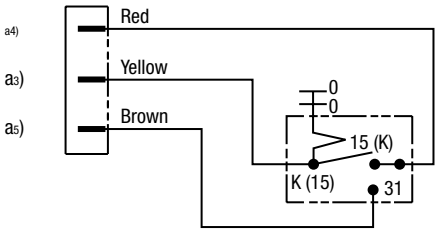


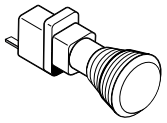
HYDRONIC M-II, WIRING DIAGRAM – 12 / 24 VOLT
P/N: 25 2800 70 1025 – M-II Harness with Albany 12/24





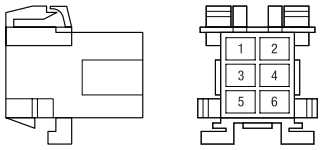
HYDRONIC M-II, CONTROLLER OPTIONS

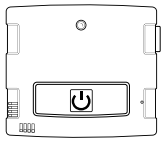




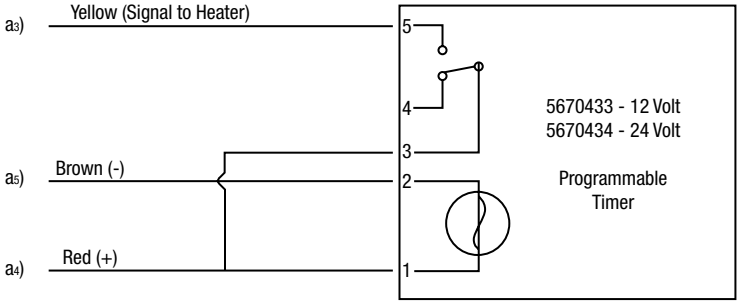
Push / Pull Switch

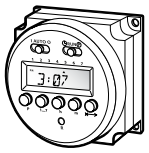
Red	Connect to pin 1	Red,+ Power
Yellow	Connect to pin 2	Yellow, ON/OFF
Brown/White	Connect to pin 3	Brown/White ground Reference
Yellow/Violet or Violet	Connect to pin 4	Optional Remote Control Input
Black/Red or Black	Connect to pin 5	Optional Status Control Output
Blue/White	Connect to pin 6	Blue/White Diagnostic



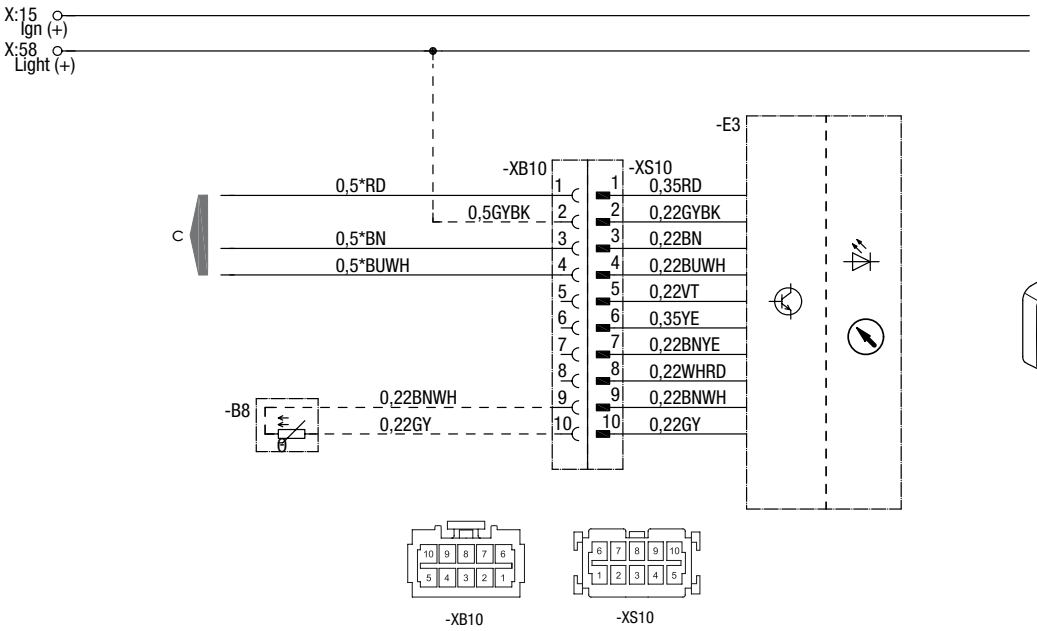


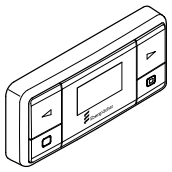
Multi-Max Controller





Programmable Timer





EasyStart Timer

6 Troubleshooting / Maintenance / Service

IN CASE OF FAULTS, PLEASE CHECK THE FOLLOWING POINTS

- **Check whether:**
  - Fuel in the tank?
  - Fuel pipes leaking? (visual check)
  - Summer diesel still in the fuel pipe?
  - Heating lever (water valve) fully set to “HOT”?
  - Combustion air system or exhaust system damaged or blocked?

- **Electrical components:**
  - Cables, connections damaged?
  - Contacts corroded?
  - Fuses defective?
  - Incorrect wiring? (short circuits, interrupted / broken)

- **Check battery voltage**
  - Battery voltage < 10 volt, the undervoltage protection of the 12 volt heater has triggered.
  - Battery voltage < 20 volt, the undervoltage protection of the 24 volt heater has triggered.

- Check the openings of the combustion air supply and exhaust system after longer standstill periods, clean if necessary!

- **Check voltage supply U_{Batt} (Terminal 30)**
  Disconnect the 12-pin connector (B2) and measure the voltage applied at the control box / blower unit between chamber A3 (cable 2.5^2 rt) and chamber A2 (cable 2.5^2 br).
  If it differs from the battery voltage, check the fuses, the supply cables, the negative connection and the positive support point on the battery for voltage drop (corrosion / interruption).

- **Check switch-on signal (S+)**
  If using the EasyStart Timer control unit.
  Disconnect the 12-pin connector (B2) at the control box / blower unit and then use the control unit to switch on the heater.
  Measure the applied voltage in the connector (B2) between chamber B4 (cable 0.75^2 bl/ws) and chamber A2 (cable 2.5^2 br). If no voltage is applied, then check the supply cable
  (cable 1^2 ge), the 5 A fuse (Item 2.7.1 in the circuit diagram) and the control unit.

In all other control units
Disconnect the 12-pin connector (B2) at the control box / blower unit and then press the button C on the control unit.
Measure the applied voltage in the connector (B2) between chamber C4 (cable 1^2 ge) and chamber A2 (cable 2.5^2 br). If no voltage is applied, then check the supply cable (cable 1^2 ge), the 5 A fuse (Item 2.7.1 in the circuit diagram) and the control unit.
Cancel the control box lock.
Cancellation of the control box lock depends on the appropriate test equipment and is described on pages 53-57.

SELF DIAGNOSTICS

The heater is equipped with self diagnostic capability. You can retrieve information on the heaters last 5 faults using the Eberspaecher EasyStart timer, Eberspaecher’s Fault Code Retrieval Device or ISO adapter and computer.

TROUBLESHOOTING

If the heater remains faulty even after these points have been checked, or another malfunction occurs in your heater, please contact:

- For installation ex works, your contract workshop.
- For subsequent installation, the workshop who installed your heater.

PLEASE NOTE!

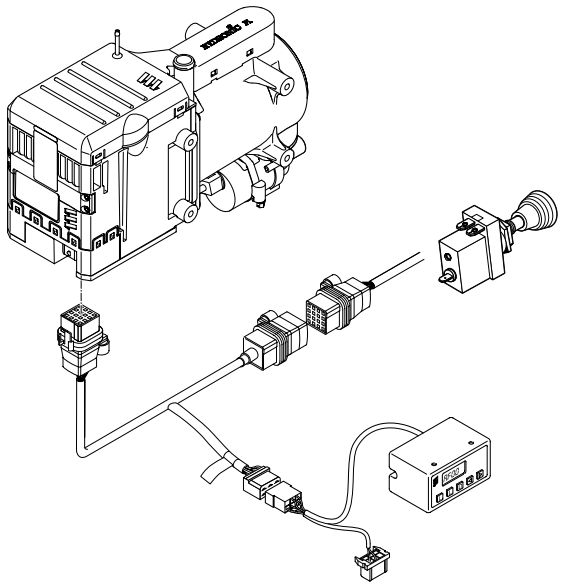
Please note that warranty claims can be become void if the heater is changed by a third party or by this installation of third party parts.

MAINTENANCE INSTRUCTIONS

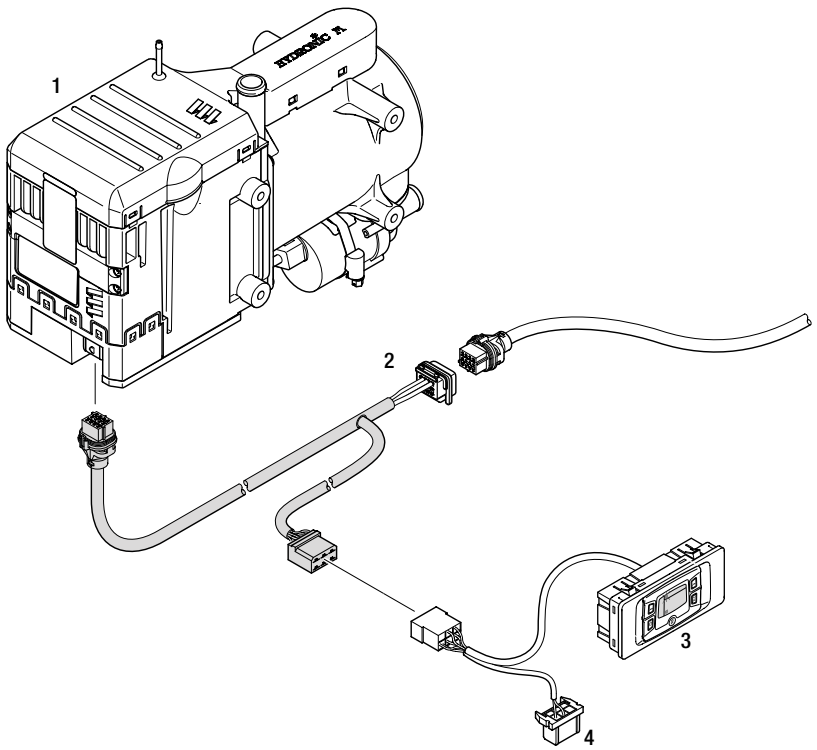
- Switch the heater on once a month for about 15 minutes, even outside the heating period.
- Before the heating period starts, the heater should undergo a trial run. If persistent extreme smoke develops, unusual burning noises or a clear fuel smell can be perceived or if electric / electronic parts heat up, the heater must be switched off and put out of service by removing the fuse.
  In this case, the heater should not be started up again until it has been checked by qualified staff who have been trained on Eberspächer heaters.
  1. Operate the heater for a minimum of 15 minutes at least once every month, throughout the whole year.
  2. Ensure that all coolant check valves in the vehicle are in fully open position, before the heater is being operated.
  3. If a programmable timer (p/n 5670433/5670434) is used to automaticall control the heater operation, review the programmed events for accuracy and make sure the timer is set to activate these timed events for the next season.
  4. Check the coolant line connections to the heater and ensure the direction of coolant flow from the heater is not reversed to that from the vehicle engine.

SERVICE TECHNICAL SUPPORT

If you have any technical questions or problems with the heater, the control unit or the operating software, please contact the following service address:
CA-TO-TechServices@eberspaecher.com



1 Heater
2 Adapter cable
3 Diagnostic Fault Code Retriever
P/N: 20 2900 70 50 60
4 Connector housing, is not connected.



OVERVIEW OF THE INDIVIDUAL TEST EQUIPMENT AND CONTROL UNITS

The electronic control box can store up to 5 faults, which can be read out and displayed. The following test equipment can be used to query the fault memory in the control box and if necessary to delete the locking of the control box:

Testing equipment	OrderNo.:
• Diagnostic Fault Code Retriever	20 2900 70 50 60
— also required:	
Adapter cable	22 1000 33 44 00
• EDiTH-Basic diagnostics tool	20 2800 70 12 00
— also required:	
Adapter cable	22 1000 33 44 00

If the diagnostics cable is connected, the following control units can also be used to query the fault memory in the control box and if necessary to delete the locking of the control box:

Control units Order No.:
- EasyStart Timer 22 1000 34 15 00

PLEASE NOTE!

If the fault memory cannot be read out, check the diagnostics cable is properly laid and is not damaged.

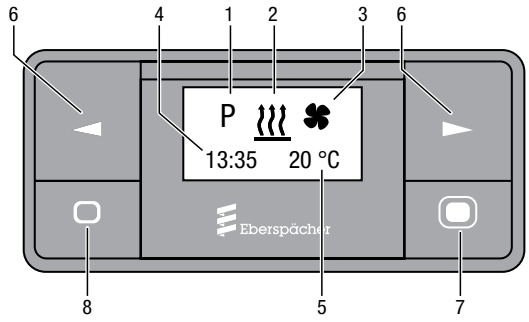
SERVICE

With an external, vehicle-specific diagnostics system
–> Consult the vehicle manufacturer.

6 Troubleshooting / Maintenance / Service

DIAGNOSTIC TOOLS

1. EASYSTAR TIMER - P/N: 22 1000 34 15 00

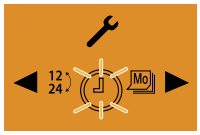


1 Program symbol
2 Heat symbol
3 Fan symbol
4 Current time
5 Temperature (Optional)
6 Menu selection button
7 Enter / “ON”
8 Exit / “OFF”

STEPS TO UNLOCK THE ECU

- Use the buttons ◄ ► to select the setting symbol in the Menu bar and confirm by pressing the button. The Setting Menu is used to set current time, weekday and local time format selecting , and symbols respectively, then confirm them by pressing the button.

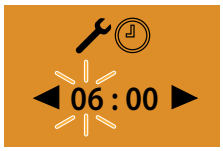
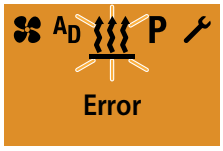
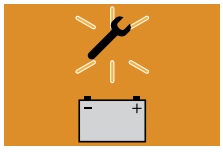
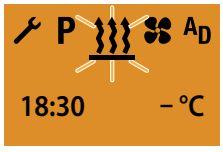
- Service/Workshop Menu
  The service/Workshop menu is a part of SETTINGS MENU , and can be accessed by pressing for more than 5 seconds while the EasyStar timer screen looks like the image below.



  In the Service/ Workshop menu, a number of different parameters of the EasyStart timer can be changed via item selection between 1.1 to 14.6.

  The Diagnostic Fault Codes can be found in the menu item # 1.1 of Service/ Workshop Menu.

DIAGNOSTIC TOOLS... Continuation

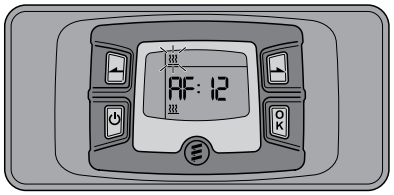
EASYSTART FAULT DISPLAYS	DESCRIPTION	REMEDY / WORKSHOP
	• Automatic detection is active. • The timer has been disconnected from the voltage and reconnected.	Wait until the automatic detection has ended, then set the time and weekday.
	• The timer has been disconnected from the voltage and reconnected. • The automatic detection has ended.	Set the time (hours and minutes) and the weekday. Then the Start display appears.
	• No communication. • It means heater can not be recognized by EasyStart timer (please see the manual) • EasyStart timer can only diagnose 12V (Not 24V) Hydronics D5 heaters with current generation ECUs (H-Kit type).	• Check and if necessary renew the heater fuse. • Check the voltage supply. • Check the wiring.
	• 1st heater fault.	Perform the heater diagnosis. • Access service/workshop menu via settings and select service function #1.1.1 to display current fault and #1.2.1 to display fault memory F1 - F5. • 1.2.1: read out memory fault 1 to 5 by selecting the function using ▭ and pressing ◄ ► buttons. • 1.3.1: Select the delete → function by pressing the ▭ button, the DEL display appears flashing, press the ▭ to confirm. “no diag” is displayed if no diagnostics cable is connected.
	• 2nd heater fault.	Perform the heater diagnosis. • Access service/Workshop menu via settings and select service function #1.1.2 to display current fault and #1.2.2 to display fault memory F1 - F5. • 1.2.2: read out memory fault 1 to 5 by selecting the function using ▭ and pressing ◄ ► buttons. • 1.3.2: Select the delete → function by pressing the ▭ button, the DEL display appears flashing, press the ▭ to confirm. “no diag” is displayed if no diagnostics cable is connected.
	• Voltage too low.	• Charge the battery. • Check the heater’s power supply.
	• Temperature sensor is defective.	Check and if necessary renew the temperature sensor.

6 Troubleshooting / Maintenance / Service

DIAGNOSTIC TOOLS... Continuation

2. DIAGNOSTIC UNIT - P/N: 20 2900 70 50 60

The diagnostic unit is solely used to read out, display and delete faults stored in all types of AIRTRONIC D2/D4 heater's electronic control boxes. The electronic control box can store up to 5 faults.
Please refer to user manual at http://www.eberspaecher-na.com/download-center.html. (Diagnostic Unit P/N: 20 2900 70 50 60, the adapter cable might also required (Order No.: 22 1000 33 44 00).



- backwards control button
- forwards control button
- activation button
- confirmation button

PERFORM THE DIAGNOSIS

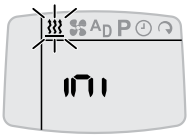
AIRTRONIC
- Disconnect the plug-in connection in the "Heater / Cable harness" cable loom.
- Connect the adapter cable to the "Heater" cable loom and to the cable harness.
- Select the heating/ventilation modes using changeover switch (if there is any).
- Plug the 6-pin connectors of Diagnostic Unit in to similar connector at adapter cable and turn ON the heater.
- Switch the ignition and parking switch ON before starting up the diagnostics on OEM heater.

AUTOMATIC DETECTION

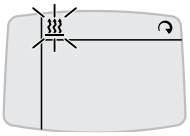
Five seconds after the dia gnostic unit has been connected to the heater using the adapter cable, the automatic detection starts to determine the type of heater to which the dia gnostic unit is connected.

PLEASE NOTE!
- Before starting diagnosis, ensure the set point value is adjusted at maximum temperature at controller.
- During the automatic detection process, some heaters are briefly activated by controller.

Display until the automatic detection is completed.



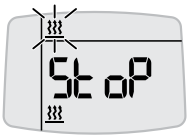
Display
- If an air heater has been detected



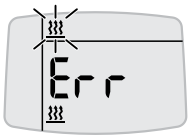
Confirm flashing symbol with OK

possible displays:

- if no errors/faults exist
  further action –> display fault memory, delete fault memory.



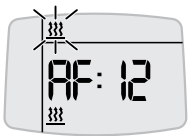
- If errors/faults exist
  further actions –> display current fault and fault memory, delete fault memory.



DISPLAY CURRENT FAULT IN FAULT MEMORY

Simultaneously press and

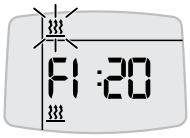
Display: e.g. AF : 12



DISPLAY FAULT MEMORY F1 – F5

press or

Display: e.g. F1 : 20

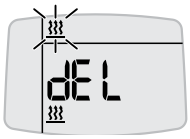


DELETE THE FAULT MEMORY CANCEL THE CONTROL BOX LOCK

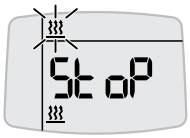
Current fault or fault F1 – F5

confirm with OK.

Confirm display dEL again with OK.



The fault memory is deleted and the control box is unlocked.



QUIT DIAGNOSIS
Switch off heater

Press OK, the heater is switched off.

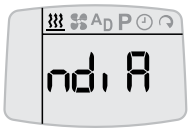
PERFORM THE DIAGNOSIS AGAIN

Press , the display is activated.

For further procedure, see left-hand column.

UNABLE TO PERFORM THE DIAGNOSIS
Automatic detection was unsuccessful

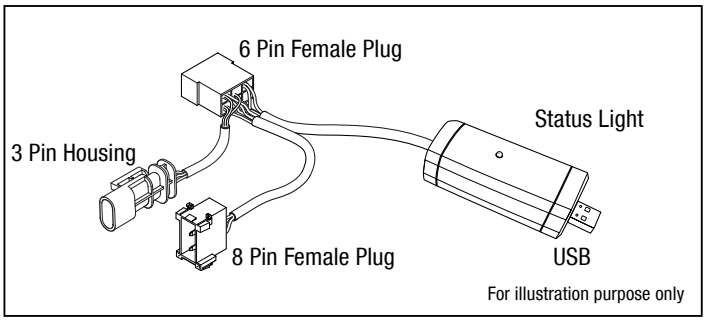
Display if the automatic detection was not successfully completed.



Possible causes:
- bl/ws diagnostic cable not connected
- bl/ws diagnostic cable is defective
  –> check for continuity, short circuit and damage.
- Heater was not detected.

DIAGNOSTIC TOOLS... Continuation

3. EUDT - P/N: 20 2800 70 12 00



Eberspaecher Climate Control Systems is proud to announce a smaller and lighter version of the current ISO adapter. This computer based diagnostic tool gives you more detailed and real time information using EDiTH diagnostic platform for troubleshooting air heaters.
You have an option to save and send the recorded EDiTH file through e-mail.

TOOLS NEEDED TO DIAGNOSE HEATER

- A PC Desktop or Laptop with 32 or 64 bit Windows OS (XP, Vista, Win 7) EDiTH Software Current version of software is EDiTH S4V4-V, please update your software: http://www.eberspaecher-na.com/download-center.html.
- EUDT.
- Adapter cables (part number: 22 1000 31 86 00).
- USB Extension.

PROCEDURE FOR SOFTWARE AND DRIVER DOWNLOAD

Install EDiTH software on PC. Follow the prompts that appear, save it at appropriate location and set up the EDiTH program. A short cut key for EDiTH appears on the desktop.

Connect the New Eberspaecher Diagnostic Tool to unused USB on the PC, and connect the necessary adaptor for the Airtronic heater to be diagnosed.
To operate EUDT hardware, use a link below for driver installation. Please ensure to select appropriate operating system (32/64 bit) before downloading and extracting the zip folder for the driver. Open Device manger and search for the new hardware and driver location in computer.

PLEASE NOTE!
Most of the current computers with WIN 7 or 8 automatically downloads drivers through Internet compatible with newly detected hardware; however, some are restricted by lack of administrator rights. For computers with Win XP, please download the driver manually at: http://www.ftdichip.com/Drivers/VCP.htm and install it.

Now you are ready to diagnose the heater, see information above for EDiTH Software.
OPERATION

Connect EUDT with computer as well as heater using adapter cable, then click on quick link for EDiTH in desktop.

Select appropriate COM PORT, and click heat symbol in EDiTH

Choose heater type and model or perform automatic detection. Then, select one of the options of heater test: General Data, Functional Check, and Switch On Component.

PLEASE NOTE! Some older airtronic heaters do not have all three options for heater testing.

ACTIVATING EDITH DIAGNOSTIC TESTS:

1 Double click the EDiTH shortcut on the desktop to launch the EDiTH program.

2 Click on the “Select Heater” icon from the navigation menu displayed.

3 Select the heater type from the groups listed in the far left column (example: Airtronic /M/L.)

4 Click and select the correct heater model number and the correct ECU version or click and run the “Automatic detection”cycle.

5 Select the diagnostic test to be activated in the far right column.

6 Click on “Start test” button.

7 Select available options depending on type of the heater i.e. General Data, Functional Test, Switch on Component. In functional check, The first step is to select a set point control via EDiTH or controller. If the heater controll is given to EDiTH, feed a set point value in a small box at top left corner in computer screen.
   - During the functional check, the box for external temperature sensor appears green when the ECU is receiving temperature value from external sources (remote temperature sensor or controller).

8 To delete the fault code, just click on the “error” and then “delete”.

9 Once tests are completed, the EDiTH file can be saved in the computer; click “save” and select appropriate location.

10 The saved tests can be replayed at later time and transfered via email for warranty purposes.
   - Before commissioning the EDiTH test, Selection of appropriate COM PORT is critical for proper data communication via USB.
   - When connected, the green LED on the ISO adapter conforms a 12/24V power supply and the amber LED (flickering light) indicates an active diagnostic link. A constantly lit red LED may indicate a communication failure between the heater and computer.
   - The latest version EDiTH software can be downloaded from the technical site of the Eberspaecher Climate Control Systems website.

For Illustration purpose only

DIAGNOSTIC TOOLS... Continuation

4. EASYSCAN - P/N: 22 1550 89 00 00

EasyScan is the latest diagnostic tool from Eberspaecher Climate Control Systems, which is replacing the current version ISO adapter kit (EDiTH S4V4-V). This computer based tool supports all currently available 12 and 24V airtronic and hydronic heaters with H-kit ECUs. The EasyScan software requires windows 7 or later version of 32 or 64 bit OS on the computer (1 GHz min) processor speed, 3 GB RAM, and USB port). It allows user to diagnose the heater using broad scope of control function and features:

1. ADVANTAGES (FUNCTIONS)
- Future-proof as a result of compatibility with widely used standards in the automotive industry (OBD).
- New, modern, user-friendly user interface.
- Comprehensive evaluation of current operating status.
- Automatic creation of a usage profile.
- Error analysis of devices and components.
- Error code display with ambient conditions.
- Function check of a vehicle application.
- Heating system commissioning support.
- Integrated results log at the end of commissioning and for diagnostic processes.
- Existing heater adapters are still applicable.
- Reliable software for the user.
- Option of direct link to the Eberspaecher Partner Portal.

2. FURTHER FEATURES
- Additional languages to those already defined are available upon request.
- PC software is downloaded via the Partner Portal.
- Software can also be installed and updated locally from data media.
- Automatic update check every time software is used.
- Delivery content includes VCI, USB cable + Y-adapter cable (Connection for current heaters as well as future applications)

PLEASE NOTE!

For installation and operation purpose, it is important to read the EasyScan manual available at http://www.eberspaecher-na.com/download-center.htm

FAULT CODES

FAULT CODE	FAULT DESCRIPTION	CAUSES / REPAIR
---	Diagnosis not possible	• Adapter cable not connected properly. • Diagnostic connection damaged. • Test ECU. Replace if necessary.
000	No faults	— —
005	Warning Short circuit in “Burglar Alarm” output	• Check connection and / or lead for continuity, short circuit and damage.
009	ADR / ADR99 shutdown	• Switch the heater off and then on again.
010	Overvoltage cutoff	Overvoltage applied to control box for at least 6 seconds. • Disconnect heater / cable harness plug-in connector, start the vehicle engine, measure the voltage. Connector B2, PIN A2 and A3: – If the voltage is >15 volt or >30 volt, check the generator regulator and / or the batery.
011	Undervoltage cutoff	Undervoltage applied to control box for at least 20 seconds without interruption. • Disconnect heater / cable harness plug-in connector, start the vehicle engine, measure the voltage. Connector B2, PIN A2 and A3: – If the voltage is <10 volt or <20 volt, then check the fuses, the supply cables, the negative connections and the positive support point at the battery for voltage drop (corrosion).
012	Overheating	Overheating sensor signals temperature greater than 120 °C. • Measure the resistive value of the overheating sensor, connector B1, PIN 2 and 4, for measured values. See page 78. – If overheating sensor ok, check connection leads for continuity, short circuit and damage. Vent air from system.
014	Possible overheating detected (Temperature difference evaluation)	Difference between measured value in overheating sensor and temperature sensor is too great. • Measure the resistive value of the temperature sensor, connector B1, PIN 2 and 4 and connector B1 PIN 1 and 2; for measured values. See page 78. – If temperature sensor ok, check connection leads for continuity, short circuit and damage. Vent air from system.
015	Too many overheats, Control box is locked	Control box locked due to too frequent overheating (fault code 012 or 014) in succession. • Unlock the control box by deleting the fault memory, see pages 53 to 57.
017	Overheating,	Max. temperature exceeded at the overheating sensor (180 °C). Sensor threshold exceeded • Check overheating sensor —> fault code 012. • Check control box.
019	Glow pin 1, Ignition energy too low	Glow pin 1 energy input is too low (< 2000 Ws) • Check glow pin for continuity, short circuit and damage—> Fault code 020. • Check control box.
020	Glow pin 1, Interruption	• Measure cold resistance of the glow pin at approx. 20 °C ambient temperature – connector B1, PIN 7 and 10.
021	Glow pin 1, Overload / short circuit downstream of (–)	• If the values are as follows the glow pin is ok, if the values differ – replace the glow pin.
022	Glow pin 1, Short circuit downstream of (+)	Measured value: • 12 volt – glow pin = 0.42 – 0.6 ohm • 24 volt – glow pin = 1.2 – 1.9 ohm – If the glow pin is ok, check the lead harness of the glow pin for continuity, short circuit and damage.

6 Troubleshooting / Maintenance / Service

FAULT CODES

FAULT CODE	FAULT DESCRIPTION	CAUSES / REPAIR
023	Glow pin 2, interruption	• Measure cold resistance of the glow pin at approx. 20 °C ambient temperature – connector B1, PIN 11 and 14.
024	Glow pin 2, overload / short circuit downstream of ground	If the values are as follows the glow pin is ok, if the values differ – replace the glow pin. Measured value: • 12 volt – glow pin = 0.42 – 0.6 ohm • 24 volt – glow pin = 1.2 – 1.9 ohm – If the glow pin is ok, check the lead harness of the glow pin for continuity, short circuit and damage.
025	Diagnostic line fault Heater remains ready for operation	• Check diagnostics cable for continuity, short circuit and damage – connector B2, PIN B4. – If ok, check control box.
026	Glow pin 2, short circuit down-stream of (+)	see fault code 023 / 024
029	Glow pin 2, Ignition energy too low	Glow pin 2 energy input is too low (< 2000 W) • Check glow pin for continuity, short circuit and damage. —> Fault code 023. • Check control box.
031	Burner motor, interruption	• Check the burner motor's connection leads for continuity, short circuit and damage – connector B1, PIN 3, 6 and 9.
032	Burner motor, overload	• Check burner motor for easy movement by manually rotating the impeller. – if not smooth running, remove the blockage.
033	Burner motor, speed error / blocked	– if ok, check control box / blower unit.
034	Burner motor short circuit downstream of (+) or (–)	
037	Water pump not working	• Check water pump. Apply voltage to the water pump – connector B1, PIN 12 and 13 (power input = max. 4 A or 2 A) – If water pump does not rotate, replace water pump. – If water pump is ok –> check control box / blower unit.
041	Water pump, interruption	• Check the water pump's connection and lead harness for continuity, short circuit and damage – connector B1, PIN 12 and 13. – If ok, check water pump —> fault code 037.
042	Water pump Overload short circuit	Water pump running dry. • Vent heater (water shortage), check water flow rate.
043	Water pump Overload downstream of +	
047	Metering pump Overload short circuit	• Check the metering pump's connection and lead harness for continuity, short circuit and damage – connector B2, PIN A1. – If ok, check the resistance of metering pump – setpoint value approx. 20 ohm.
048	Metering pump interruption	
049	Metering pump Overload downstream of +Ub	

FAULT CODES

FAULT CODE	FAULT DESCRIPTION	CAUSES / REPAIR
050	Too many attempted starts Control box is locked	Control box locked due to repeated switching on in succession without flame detection (fault code 052). • Check fuel supply, exhaust and combustion air system. • Check glow pin –> see fault code 019 to 024 / 026 / 029. • Check flame sensor –> fault code 064 / 065. • Unlock the control box by deleting the fault memory.
052	Exceeding of safety time	No flame detected within the start phase. Flame sensor value < 80 °C, therefore automatic shutdown because safety time exceeded. • Check fuel supply, exhaust and combustion air system. • Check glow pin –> see fault code 019 to 024 / 026 / 029. • Check flame sensor –> fault code 064 / 065.
053	Flame cutout in “POWER” control stage	Heater ignited (flame detected) and signals flame cutout during a power stage. • Check fuel quantity, blower speed, fuel supply, exhaust and combustion air system.
054	Flame cutout in “HIGH” control stage	• Check flame sensor –> fault code 064 / 065.
055	Flame cutout in “Medium” control stage (D8W / D10W) “Medium1” control stage (D12W)	
056	Flame cutout in “Medium 2” control stage (D12W)	
057	Flame cutout in “Medium 3” control stage (D12W)	
058	Flame cutout in “LOW” control stage	
059	Too rapid rise in water temperature	• Vent air from system, check water flow rate. • Check temperature sensor –> fault code 060 / 061
060	Temperature sensor interruption	Temperature sensor signals temperature value outside the measuring range.
061	Temperature sensor short circuit	• Measure the resistive value of the temperature sensor, Connector B1, PIN 1 and 2; for measured values. See page 78. – If temperature sensor ok, check connection leads for continuity, short circuit and damage.
064	Flame sensor interruption	Flame sensor signals temperature value outside the measuring range.
065	Flame sensor short circuit	• Measure the resistive value of the flame sensor – connector B1, PIN 5 and 8; for measured values. See page 79. – If flame sensor ok, check connection leads for continuity, short circuit and damage.
071	Overheating sensor interruption	Overheating sensor signals temperature value outside the measuring range. • Check overheating sensor –> fault code 012.
072	Overheating sensor short circuit	
074	Overheating detection hardware is defective, operating lock-out	• Control box is defective. Replace control box / blower unit.

6 Troubleshooting / Maintenance / Service

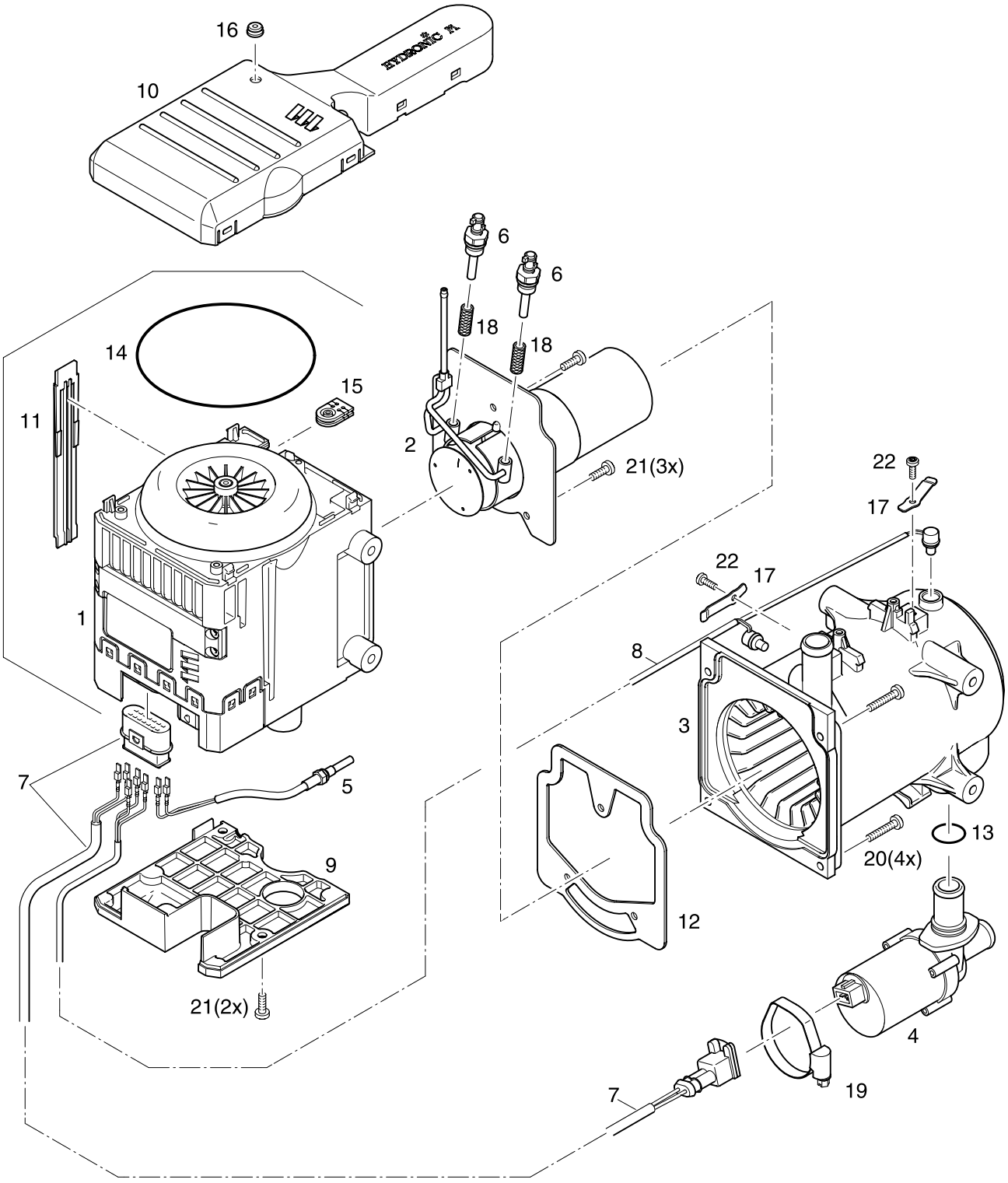
FAULT CODES

FAULT CODE	FAULT DESCRIPTION	CAUSES / REPAIR
090	External reset	• Control box reset by external interference voltage. Check voltage supply, e.g. battery, leads, generator, fuses.
091	Internal reset	• Internal control box fault, replace control box / blower unit.
092	ROM error	
093	RAM error, at least one RAM cell isnot working	
094	EEPROM error, checksum error within the area of the operating data, diagnostic parameters or calibration values	
095	Invalid data record, checksum error	
096	Internal temperature sensor is defective/ ECU too hot	
097	Internal device error	
098	Main relay is faulty	
099	Too many resets, operating lock-out	

PLEASE NOTE!

*To avoid inefficient expenses, it is strongly recommended to have the heater diagnosed by specialist before replacing expensive parts.

ASSEMBLY DRAWING



7 Repair Instructions

PARTS LIST

1 Impeller cover
2 O-ring 117.07 x 3.53
3 Cover, side
4 Impeller
5 Glow pin 1
6 Glow pin 2
7 Glow pin screen
8 Combustion chamber
9 M5 x 16 TAPTITE / DIN 7500 TORX screw
10 Control box / blower unit
11 Flame sensor
12 Cable tie
13 Electric motor cover
14 M5 x 16 TAPTITE / DIN 7500 TORX screw
15 M4 x 12 TAPTITE / DIN 7985 TORX screw
16 Compression spring
17 Overheating sensor
18 Temperature sensor
19 Overheating / temperature sensor cable loom
20 Jacket with heat exchanger
21 M5 x 25 TAPTITE / DIN 7500 TORX screw
22 Grommet
23 Combustion chamber seal
24 Water pump cable loom connector
25 Hose clip
26 Water pump
27 O-ring 19.8 x 2.3
28 Assembly tool for glow pin screen
29 14-pin connector
30 Special washer 6.4 x 11 x 3.2 (required for control box / blower unit without strengthening flange)

PLEASE NOTE!

NOTES ON VARIOUS COMPONENTS

- CONTROL BOX/BLOWER UNIT, ITEM 10
  Control box / blower unit and electric motor cannot be dismantled. If these components are defective the complete control box / blower unit must be replaced.

- JACKET WITH HEAT EXCHANGER, ITEM 20
  The jacket and heat exchanger cannot be dismantled. If these components are defective the complete jacket with heat exchanger component must be replaced.

- O-RING, ITEM 2
  The O-ring is included in the scope of supply of the ET part “control box / blower unit”. The O-ring is also available as a component part.

- COMBUSTION CHAMBER SEAL, ITEM 23
  The combustion chamber seal is included in the scope of supply of the following ET parts:
  – Jacket with heat exchanger (20)
  – Combustion chamber (8)
  – Glow pin (5) and (6)
  The combustion chamber seal is also available as a component part.

REPAIR INSTRUCTIONS

The permitted repair work on the heater is described in this chapter. The heater must be removed from the vehicle for the repair work to be carried out.

The heater is assembled in the reverse order, note and follow any additional instructions.

PLEASE NOTE!

After completing all the work and installing the heater in the vehicle, perform a functional check on the heater.

Always observe the following safety instructions before working on the heater

⚠ WARNING- RISK OF INJURY, BURNS AND POISONING

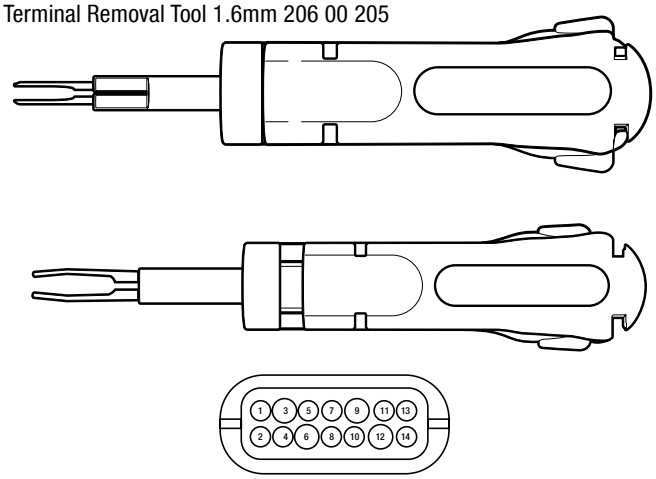
- Ensure power is disconnected from heater and that coolant is cool before dismantling the heater.
- The heater must not be operated in closed rooms such as garages or workshops.
  Exception:
  Exhaust suction available directly at the entry to the exhaust pipe on the heater.

⚠ CAUTION:

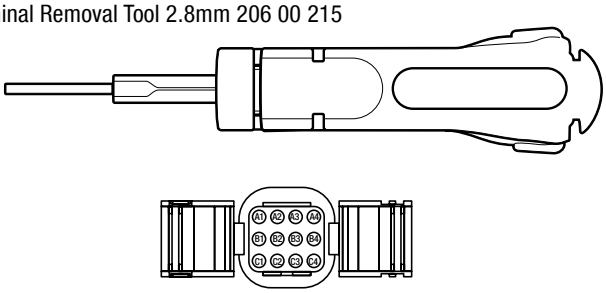
- The seals of dismantled components must be renewed.
- During repair work, check all components for damage and if necessary replace.
- Check connector contacts, plug-in connections and cables for corrosion and damage and if necessary repair.
- Only use Eberspaecher spare parts if replacements are necessary.
- After working on the coolant circuit the level of the coolant must be checked and if necessary topped up according to the vehicle manufacturer's instructions.
  The coolant circuit must then be vented.
- Operation or the "after running" of the heater may only be stopped in an emergency (Turn off switch, remove fuse or disconnect battery) by the battery current (risk of heater over-heating).

Terminal Removal Tools are used to release plug-in contacts in a connector housing.

Terminal Removal Tool 1.6mm 206 00 205



Terminal Removal Tool 2.8mm 206 00 215



7 Repair Instructions

REPAIR INSTRUCTIONS

Figure 1 and 2

- Clamp the removed heater in a retaining device (vice).
- Using 2 screwdrivers, always undo 2 snap connections of the impeller cover at a time, starting at the control box / blower unit. Keep to the order shown in the figure (1. – 8.)
- Remove cover.
- Remove O-ring (2).

PLEASE NOTE!

The O-ring (2) must always be replaced and lube with synthetic lube.

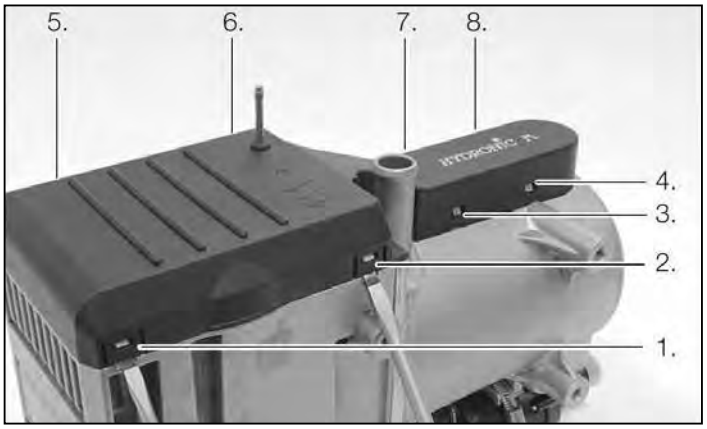
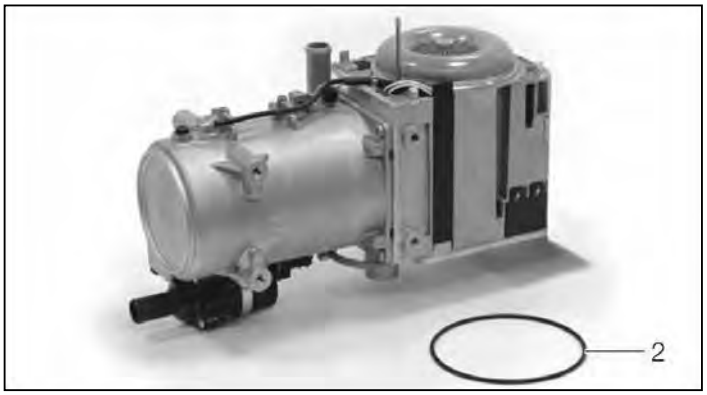


Figure 1



2 O-ring

Figure 2

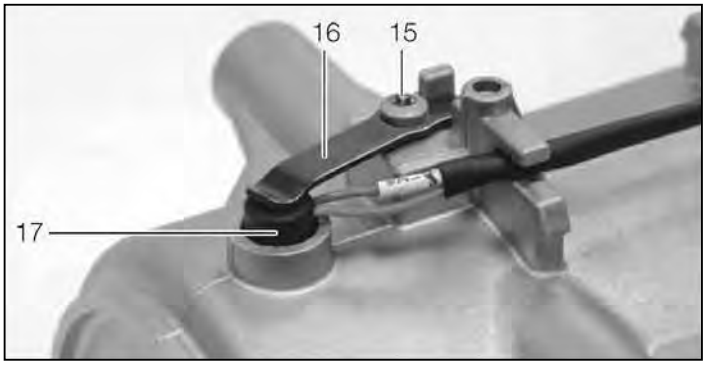
REMOVE OVER HEATING SENSOR AND TEMPERATURE SENSOR

Figure 3 and 5

- Remove the (15) M4 x 12 screws of the compressive springs (16) and use pliers to pull off the overheating (17) and temperature sensor (18).

PLEASE NOTE!

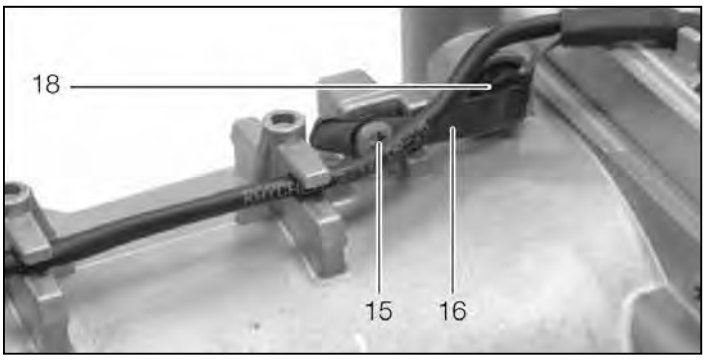
Do not pull out the overheating (17) and temperature sensor (18) from the holder by pulling on the connection cable, always use pliers to remove them.



15 M4 x 12 screw

16 Compression spring

Figure 4

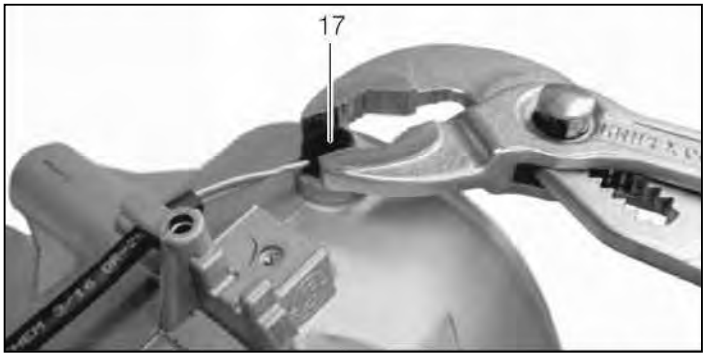


15 M4 x 12 screw

16 Compression spring

18 Temperature sensor

Figure 3



17 Overheating sensor

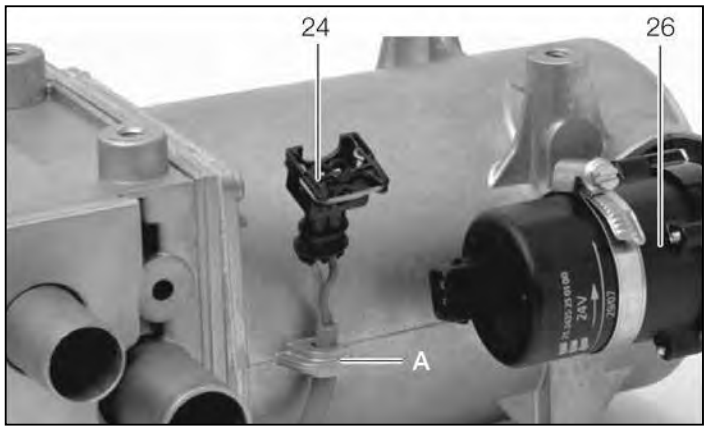
Figure 5

Repair step 1

DISMANTLE CONTROL BOX/BLOWER UNIT AND JACKET
REMOVE WATER PUMP CONNECTOR

Figure 6

- Disconnect the connector (24) at the water pump (26) and pull the cable loom out of the holder.



A Holder for cable loom
24 Water pump connector
26 Water pump

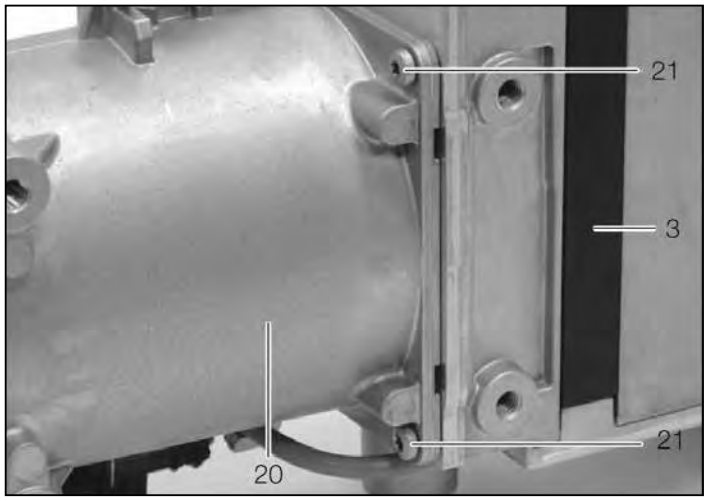
Figure 6

REMOVE SIDE COVER AND DISMANTLE JACKET

Figure 7

- Pull out side cover (3) from above.
- Undo the 4 screws (21) M5x25 in the jacket (20) and remove the jacket from the control box / blower unit.

PLEASE NOTE!
The control box / blower unit may not be placed on the exposed impeller.



3 Cover, side
20 Jacket
21 M5 x 25 screw (4 screws)

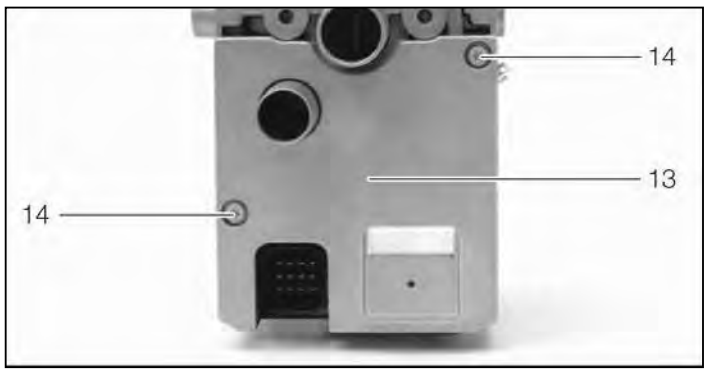
Figure 7

Remove electric motor cover

Figure 8

- Undo the 2 screws (14) M5 x 16 of the electric motor cover (13) and remove the cover.

PLEASE NOTE!
The control box / blower unit may not be placed on the exposed impeller.



13 Electric motor cover
14 M5 x 16 screw

Figure 8

7 Repair Instructions

Repair step 1

DISMANTLE CONTROL BOX/BLOWER UNIT AND JACKET

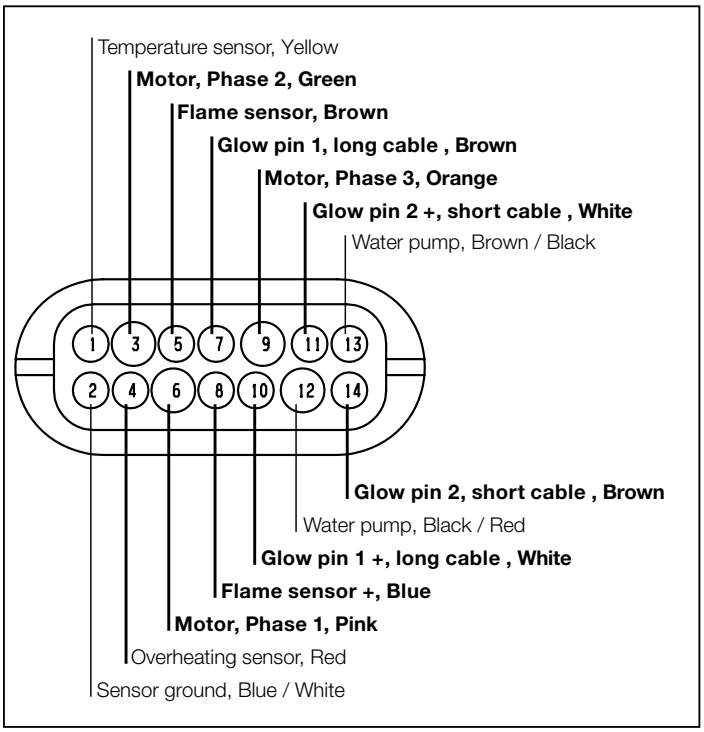
DISCONNECT 14-PIN CONNECTOR AT CONTROL BOX AND RELEASE CABLES

Figure 9 - 11 / Sketch 1

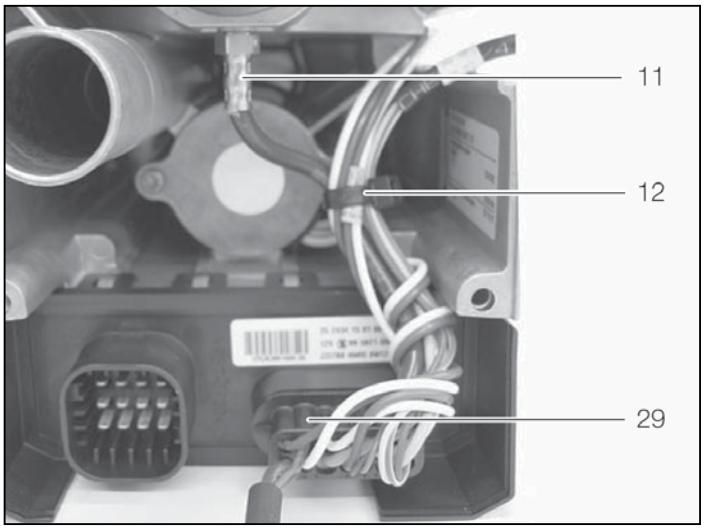
- Use side cutters to open the cable tie (12).
- Disconnect the 14-pin connector (29).
- Use the terminal removal tool to remove pins in the 14-pin connector (29) for the electric motor, flame sensor (11), glow pin 1(5) and glow pin 2 (6).
- Expose the cables of the two glow pins from above (cable duct).

PLEASE NOTE!

When replacing the control box / blower unit, the Temp / Overheat sensor and water pump lead harnesses can be left in the 14-pin connector (29).

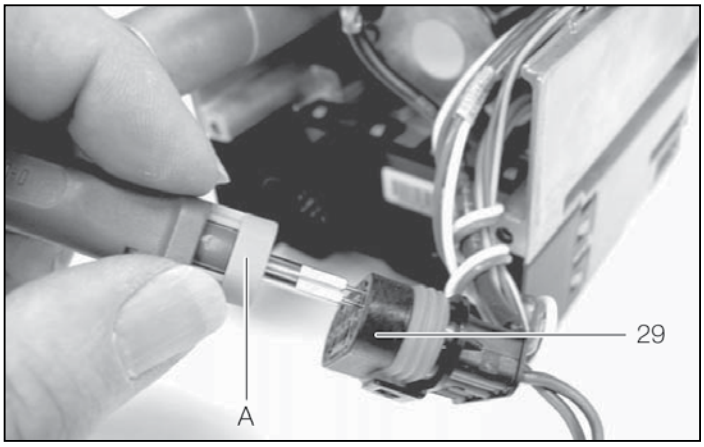


Sketch 1



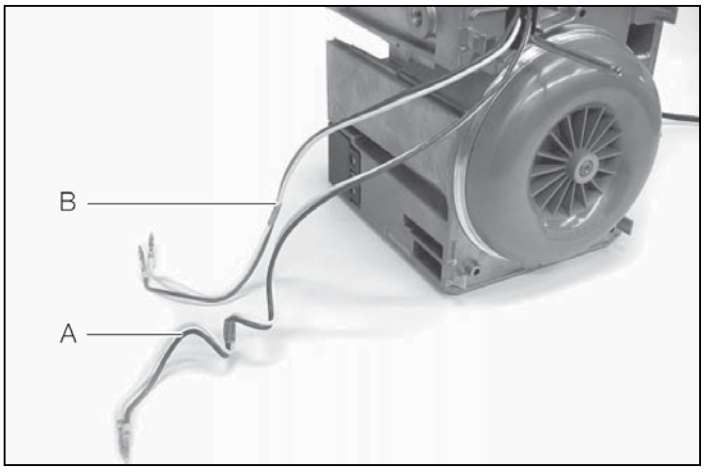
11 Flame sensor
12 Cable tie
29 14-pin connector

Figure 9



A AMP release tool
29 14-pin connector

Figure 10



A Long wire (brown, white)
B Short wire (brown, white)

Figure 11

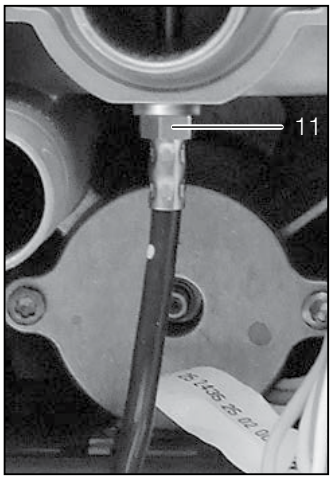
Repair step 1

DISMANTLE CONTROL BOX/BLOWER UNIT AND JACKET

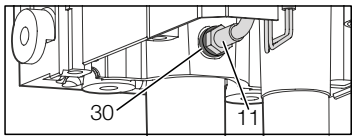
REMOVE FLAME SENSOR

Figure 12

- Unscrew the flame sensor (11) from the housing of the control box / blower unit.



11 Flame sensor



Control box / blower unit without strengthening flange
30 Special washer
11 Flame sensor

Figure 12

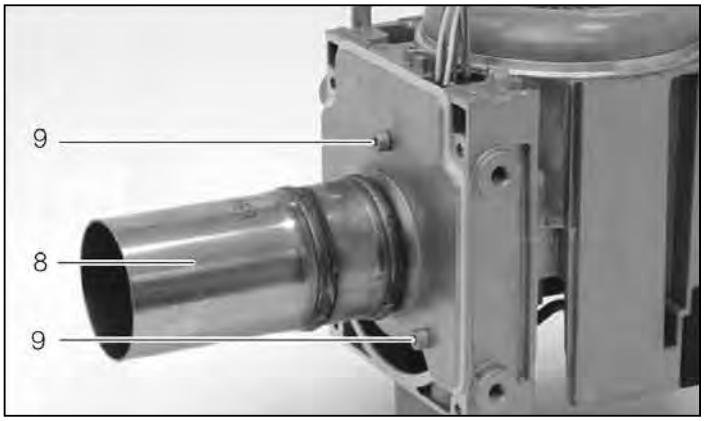
DISMANTLE COMBUSTION CHAMBER

Figure 13 and 14

- Undo the 3 screws (9) M5 x 16 of the combustion chamber (8).
- Lift the combustion chamber (8) with the fuel pipe until the grommet (22) is exposed, then remove the combustion chamber.
- Remove combustion chamber seal (23).

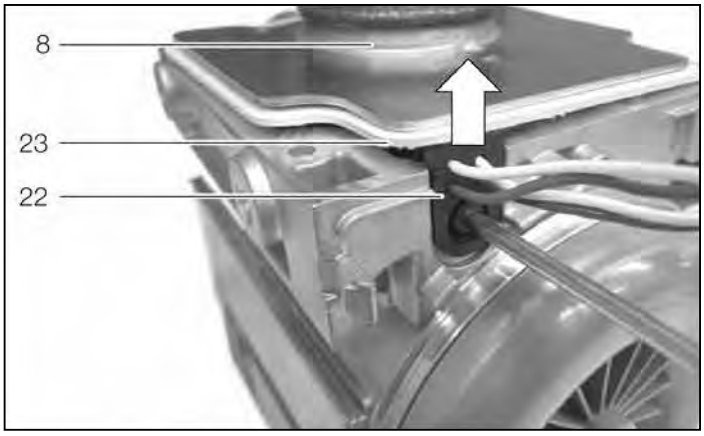
PLEASE NOTE!

Remove combustion chamber seal (23) without leaving residues. Always check the glow pins during this repair step, see repair step 3.



8 Combustion chamber
9 M5 x 16 screw (3 screws)

Figure 13



8 Combustion chamber
22 Grommet
23 Combustion chamber seal

Figure 14

Repair step 2

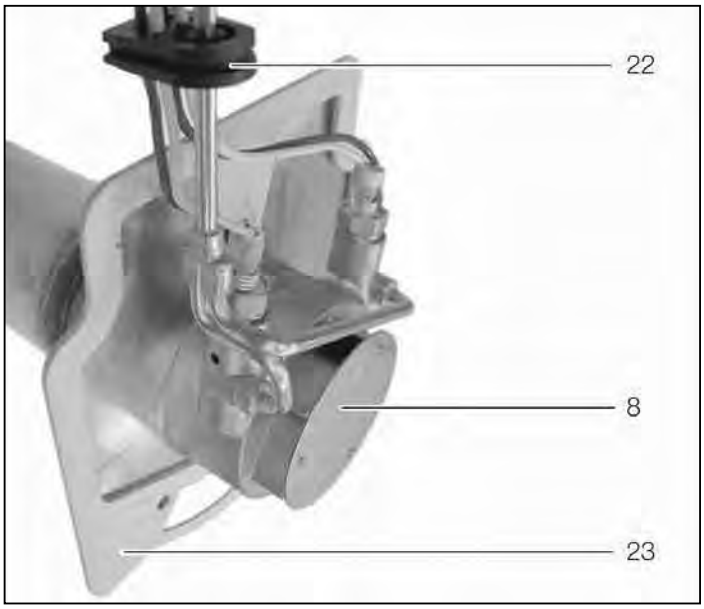
ASSEMBLE CONTROL BOX/BLOWER UNIT AND JACKET

INSTALL COMBUSTION CHAMBER SEAL

Figure 15 and 16

- Carefully guide the combustion chamber seal (23) over the cables of the glow pins and over the fuel pipes and position on the combustion chamber (8).

PLEASE NOTE!
Take care when installing the new combustion chamber seal (23) as there is a risk of breaking it.



8 Combustion chamber
22 Grommet
23 Combustion chamber seal

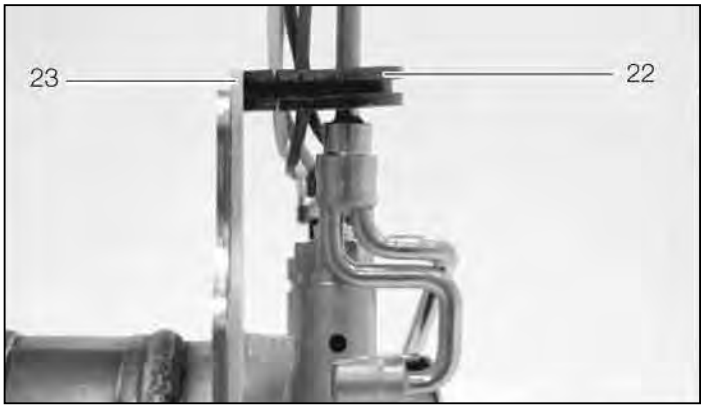
Figure 15

INSTALL GROMMET

Figure 16 and 17

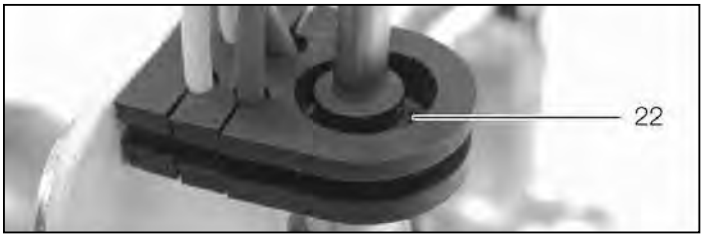
- Carefully position the grommet (22) on the combustion chamber seal (23).

PLEASE NOTE!
Ensure the grommet is installed in the correct position, see Figure 17.



22 Grommet
23 Combustion chamber seal

Figure 16



22 Grommet, connect position

Figure 17

The large opening of the grommet at the fuel tube must be visible from avobe.

INSERT COMBUSTION CHAMBER

Figure 18

- First insert the combustion chamber (8) with the grommet (22) into the control box / blower unit (10). If the grommet (22) has been completely inserted, align the combustion chamber and combustion chamber seal with the control box / blower unit (10).

8 Combustion chamber
22 Grommet
23 Combustion chamber seal

Figure 18

Repair step 2

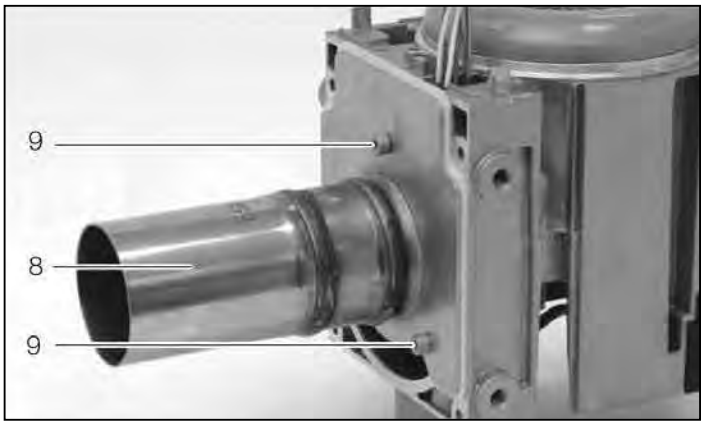
ASSEMBLE CONTROL BOX/BLOWER UNIT AND JACKET

INSTALL COMBUSTION CHAMBER

Figure 19

- Use 3 screws (9) M5 x 16 to fix the combustion chamber (8).

Tightening torque M5 x 16 screw.



8 Combustion chamber
9 M5 x 16 screw (3 screws)

Figure 19

INSTALL GROMMET

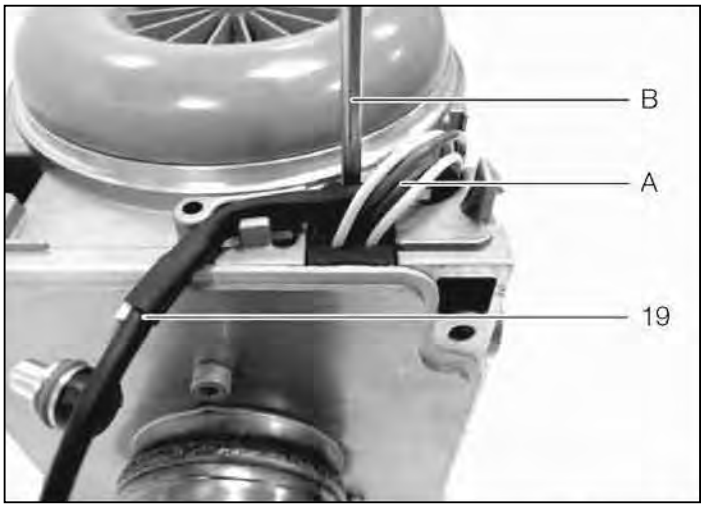
Figure 20

- First lay the sensor lead harness (19) in the side cable duct, then lay the 4 leads of glow pins 1 (5) and 2 (6) in the cable duct.
  Lay the sensor lead harness (19) and the glow pin leads to the 14-pin connector (29 - shown in page 72).

- Position the side cover (3) on the middle of the control box/blower unit (10) and push into the cable duct guide.

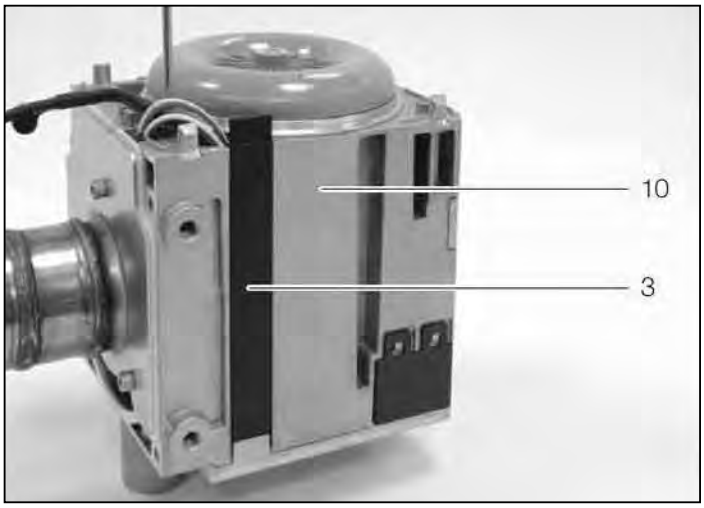
PLEASE NOTE!

It is imperative to keep to the correct laying order for the sensor lead harness
(19) and the glow pin leads.
The glow pin leads may not be laid underneath the sensor lead harness (19).
The sensor lead harness (19) must be laid in the area of the fuel pipe as shown in Figure 20.
The side cover (3) is conical at the bottom to simplify installation.



A Leads of the glow pin 1 (5) and 2 (6)
B Fuel pipe
19 Sensor cable loom

Figure 20



3 Cover, side

Figure 21

Repair step 2

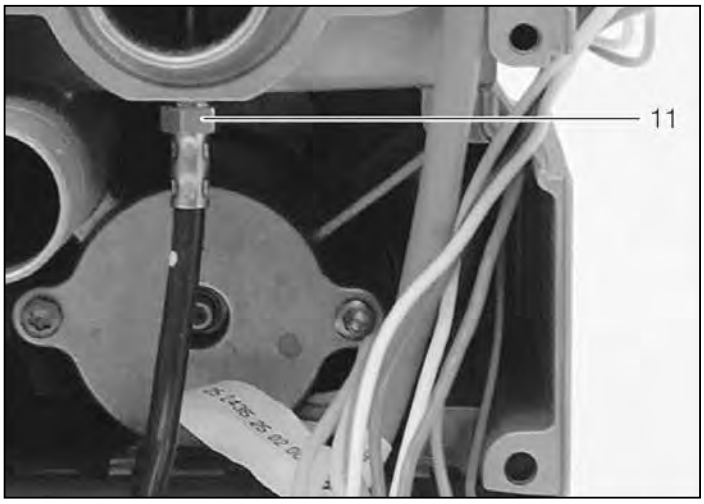
ASSEMBLE CONTROL BOX/BLOWER UNIT AND JACKET

INSTALL FLAME SENSOR

Figure 22

- Screw the flame sensor (11) into the housing of the control box/blower unit.

Flame sensor tightening torque.

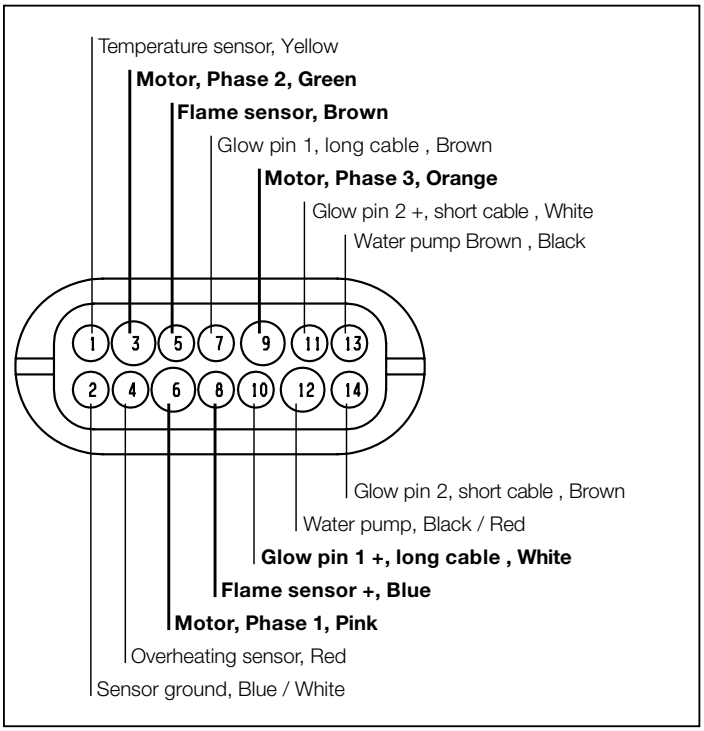


11 Flame Sensor Figure 22

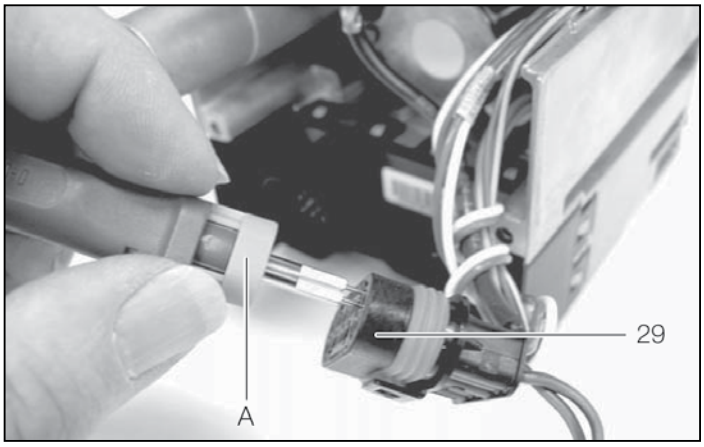
CONNECT FLAME SENSOR LEAD HARNESS AND ELECTRIC MOTOR LEADS

Figure 23 / Sketch 2

- Latch the flame sensor lead harness (11) and the three leads of the electric motor into position in the 14-pin connector (29).



Sketch 2



29 14-pin connector Figure 23

PLEASE NOTE!

- The leads may not lay against the housing.
- Always lay the Brown / White (long) leads of glow pin 1 (5) last and latch into position in the 14-pin connector (29).

Repair step 2

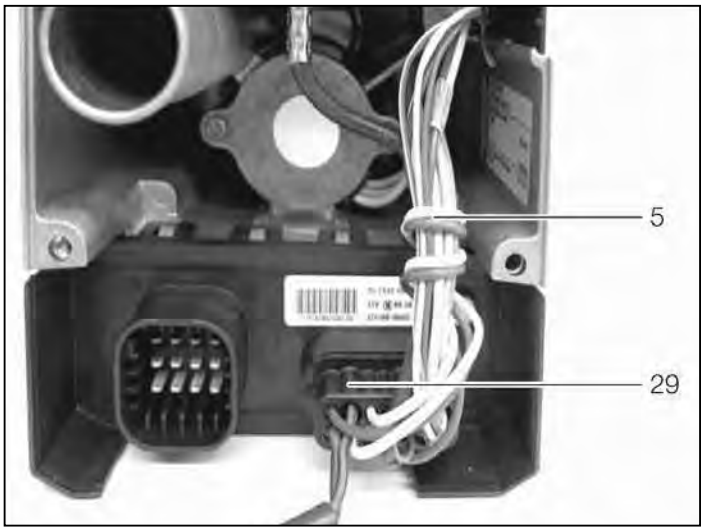
ASSEMBLE CONTROL BOX/BLOWER UNIT AND JACKET

CONNECT THE GLOW PIN LEADS

Figure 24, 25 and Sketch 3

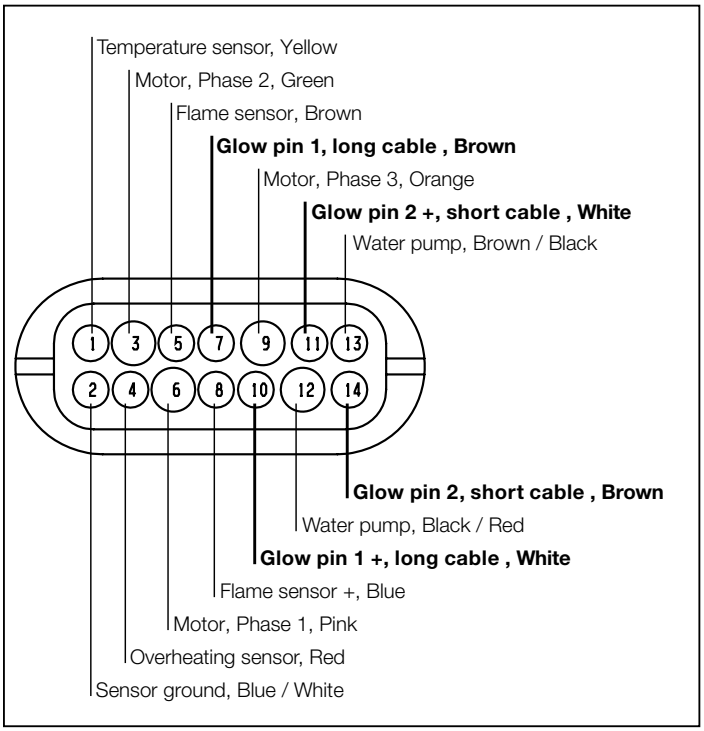
- First, latch the leads of glow pin 2 (6 / short leads) into position in the 14-pin connector (29).

  Then wind the leads of glow pin 1 (5) 2 x around the leads already latched into position in the 14-pin connector and then latch into position in the 14-pin connector (29).
  Use a cable tie (12) to bundle all leads above the winding.
  Connect the 14-pin connector (29) to the control box / blower unit.



5 Long cable, glow pin 1 Figure 24
29 14-pin connector

5 Long cable, glow pin 1 Figure 25
12 Cable tie (use side cutters to shorten surplus tie lenght)



Sketch 3

- First, latch the leads of glow pin 2 (6 / short leads) into position in the 14-pin connector (29).

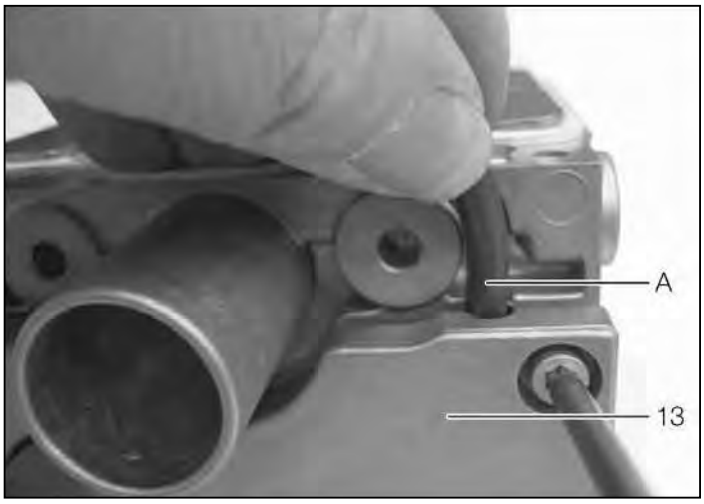
Repair step 2

ASSEMBLE CONTROL BOX/BLOWER UNIT AND JACKET

INSTALL ELECTRIC MOTOR COVER

Figure 26 and 27

- Position the electric motor cover (13) on the housing of the control box / blower unit, at the same time, insert the water pump lead harness in the groove provided in the cover.
- Use 2 screws (14) M5 x 16 to fasten the electric motor cover (13) onto the housing of the control box / blower unit.



A Water pump lead harness
13 Electric motor cover

Figure 26

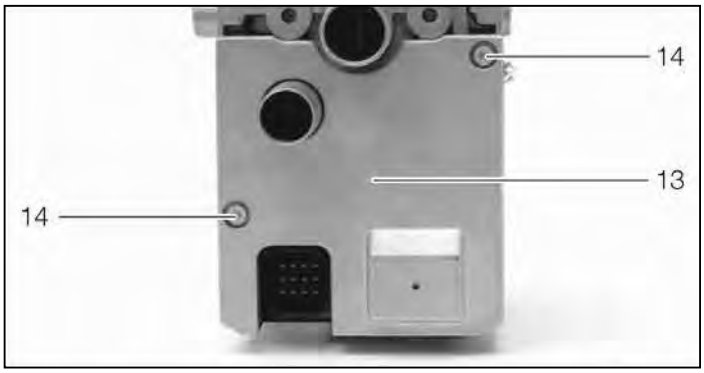
ASSEMBLE CONTROL BOX/BLOWER UNIT AND JACKET

Figure 28

Position the heat exchanger on the control box/blower unit and fasten with 4 screws (21) M5 x 25.

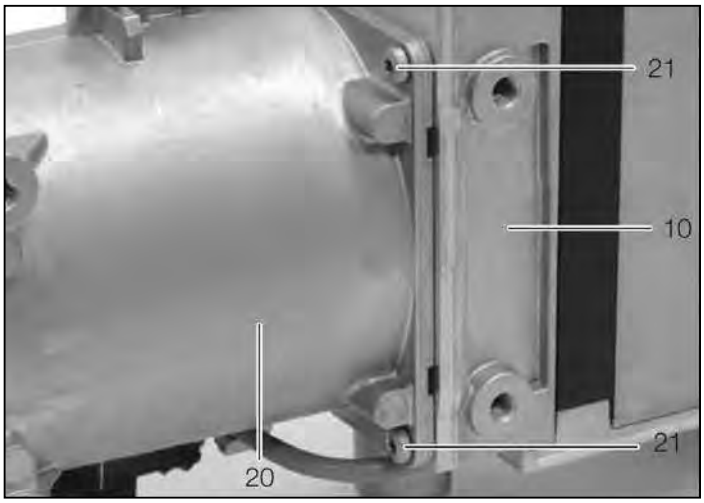
PLEASE NOTE!

Tighten the 4 screws (21) M5 x 25 cross-wise (i.e. tighten diagonally opposite screws).



13 Electric motor cover
14 M5 x 16 screw

Figure 27



13 Electric motor cover
14 M5 x 16 screw

Figure 27

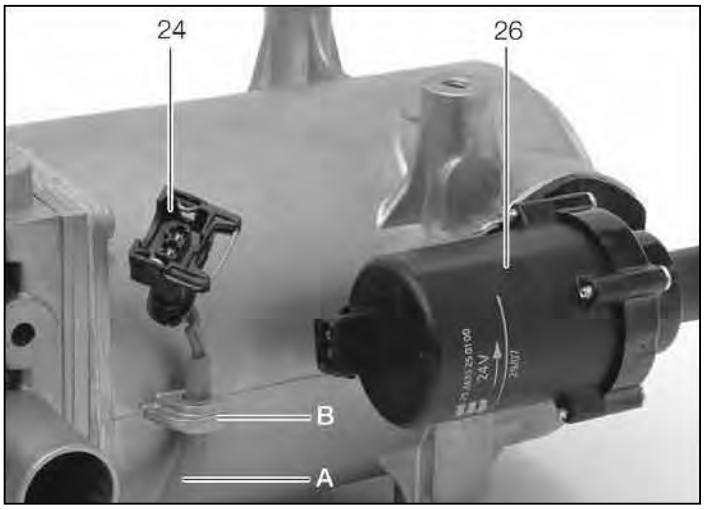
Repair step 2

ASSEMBLE CONTROL BOX/BLOWER UNIT AND JACKET

LAY WATER PUMP LEAD HARNESS

Figure 29

- Insert the water pump lead harness into the holder on the jacket, lay up to the water pump and connect.



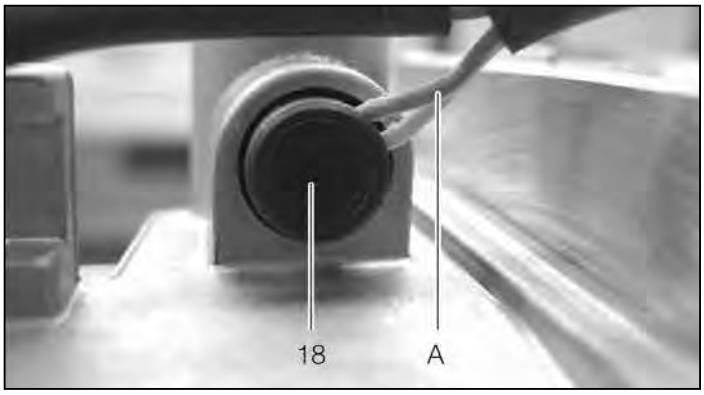
24 Water pump connector
26 Water pump
A Water pump cable harness loom
B Holder on jacket with heat exchanger

Figure 29

INSTALL OVERHEATING AND TEMPERATURE SENSOR

Figure 30 and 31

- Insert the overheating (17) and temperature sensor (18) into the holders on the jacket.
- Insert the sensor cable loom (19) into the holders on the jacket.
- Use 2 screws (15) M4 x 12 to fasten both springs (16) on the overheating (17) and temperature sensor (18).

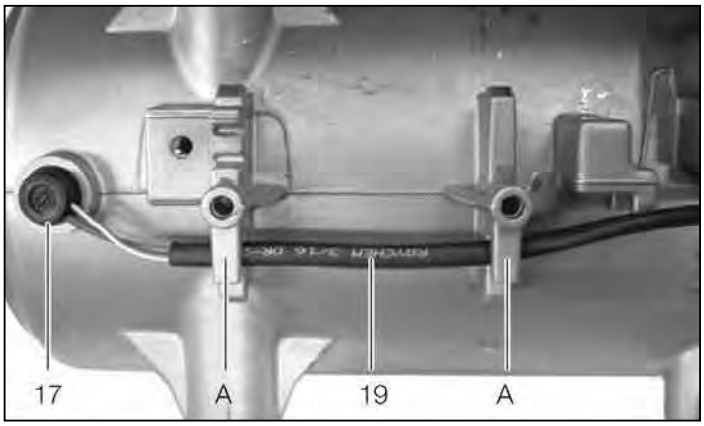


A Correct installed position and cable routing
18 Temperature sensor

Figure 30

PLEASE NOTE!

Insert the temperature sensor as shown in the figure to avoid pinching the cable loom.



A Holder
17 Overheating sensor
19 Sensor cable icon

Figure 31

Repair step 2

ASSEMBLE CONTROL BOX/BLOWER UNIT AND JACKET

INSTALL IMPELLER COVER

Figure 32

- Clamp the removed heater in a retaining device (vice) and position the new O-ring (2) on the control box / blower unit.
- Install the impeller cover; ensure that none of the leads of the sensor lead harness (19) get jammed.

2 O-ring, positioned on the control box / blower unit. Figure 32

Repair step 3

CONTROL BOX/BLOWER UNIT AND JACKET

REMOVE / CHECK GLOW PIN

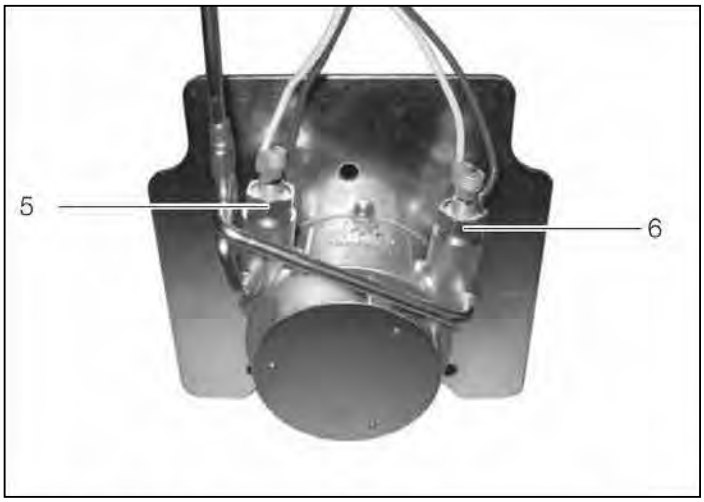
Figure 33

- Carry out repair step 1.
- Unscrew glow pins 1 (5) and 2 (6) from the combustion cham ber housing (8) (See page 36), if necessary check the glow pins; for check values see fault code 020 / 021.
- Visually check the glow pin screen, if necessary renew the glow pin lining.

INSTALL GLOW PIN

Figure 33

- Screw glow pin 1 (5) with long connection leads into the lefthand glow pin socket (2 fuel lines).
- Screw glow pin 2 (6) with short connection leads into the righthand glow pin socket (1 fuel line).
- Assemble the heater according to repair step 2.



5 Glow pin 1 with long connection leads. installed in left-hand glow pin socket
6 Glow pin 2 with short connection leads, installed in right-hand glow pin socket

Figure 33

CHARACTERISTICS OF THE GLOW PINS

Glow pin 1 (5) long leads
- brown lead in Chamber 7
- white lead in Chamber 10

Glow pin 2 (6) short leads
- brown lead in Chamber 14
- white lead in Chamber 11
  12 volt glow pin
- green band around the brown and white leads
  24 volt glow pin
- yellow band around the brown and white leads

CLEAN VENTILATION HOLES

Figure 34

- Use a pointed object to clean the ventilation holes in the left-hand and right-hand glow pin sockets.

A Right-hand glow pin socket
B Pointed object for cleaning the ventilation hole

Figure 34

Repair step 4

REMOVE GLOW PIN SCREEN

Figure 35

- Carry out repair step 1.
- Unscrew glow pin from the combustion chamber housing (8).
- Use a pointed object to pull the glow pin screen out of the glow pin socket.

A Pointed object for pulling out the lining
7 Glow pin socket lining

Figure 35

INSTALL GLOW PIN SCREEN

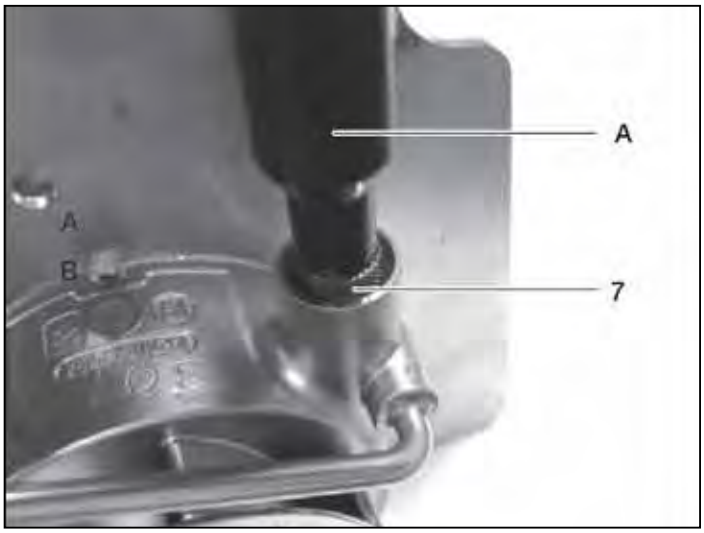
Figure 36, 36/1

- Insert the glow pin screen, with the bevelled edge facing upwards, into the glow pin sockets up to the limit stop.

PLEASE NOTE!

Ensure the ventilation hole in the glow pin socket is not concealed by the glow pin screen.

- Assemble the heater according to repair step 2.



A Screen installation tool
7 Glow pin screen

Figure 36

A Ventilation hole
B Glow pin socket with lining installed

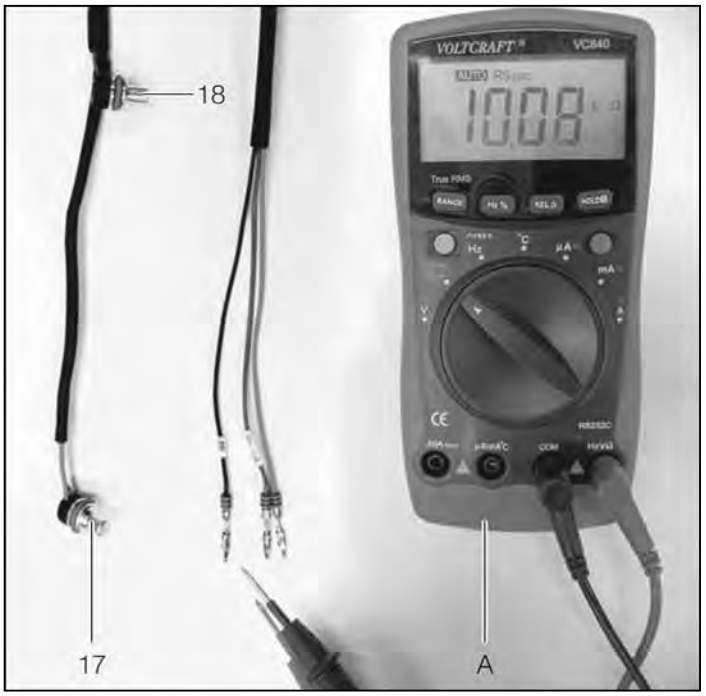
Bild 36/1

Repair step 5

CHECK OVERHEATING AND TEMPERATURE SENSOR

Figure 37 / Diagram 1

- Removal of the overheating (17) and temperature sensor (18) is described in repair step 1.
- Use the digital multimeter to check the overheating (17) and temperature sensor (18).
  If the resistance value lies outside the table of values or the diagram, then replace the overheating (17) and temperature sensor (18).
- Installation of the overheating (17) and temperature sensor (18) is described in repair step 2.



A Digital multimiter
17 Overheating sensor
18 Temperature sensor

Figure 37

Table of values

Temp[°C]	0	25	40	60	80	100	120
Temp[°F]	32	77	104	140	176	212	248
R_{NTC} [kΩ]	32.55	10	5.33	2.49	1.26	0.677	0.389

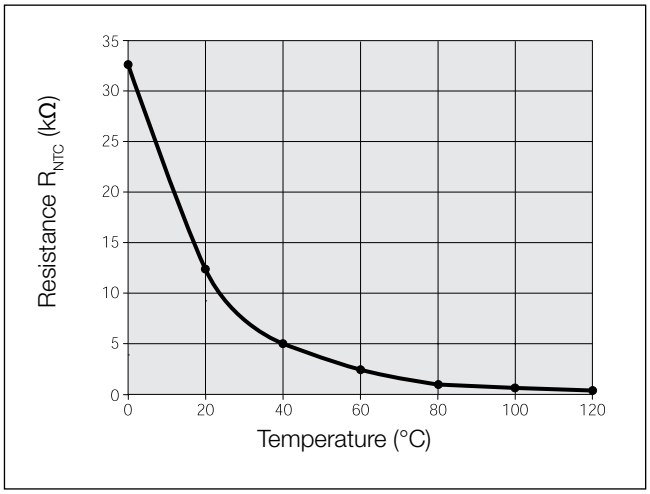


Diagram 1

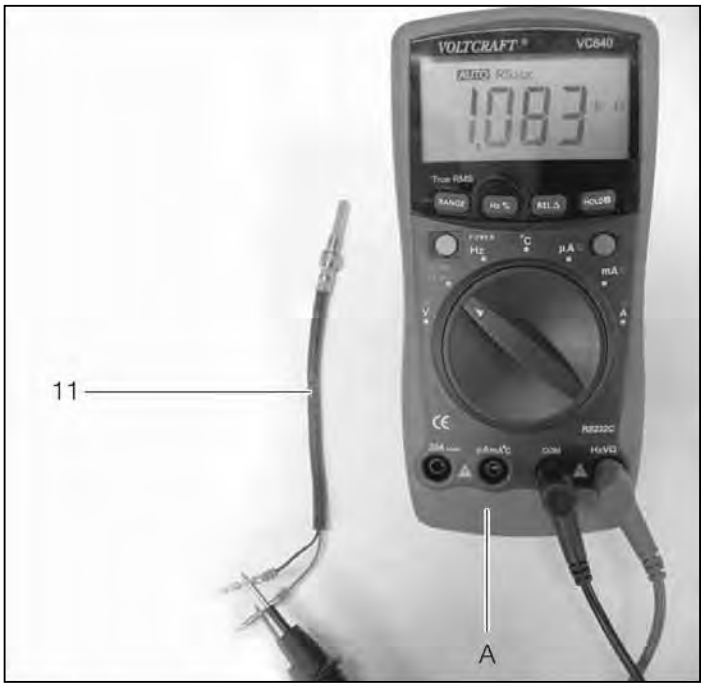
7 Repair Instructions

Repair step 6

CHECK FLAME SENSOR

Figure 38 / Diagram 2

- Removal of the flame sensor (11) is described in repair step 1.
- Use the digital multimeter to check the flame sensor (11). If the resistance value lies outside the table of values or the diagram, then replace the flame sensor (11).
- Installation of the flame sensor (11) is described in repair step 2.



A Digital multimiter
11 Flame sensor

Figure 38

Table of values

Temp[°C]	-50	0	50	100	150	200	250	300	350	400
Temp[°F]	-58	32	122	212	302	392	482	572	662	752
R [Ω]	803	1000	1194	1385	1573	1758	1941	2120	2297	2470

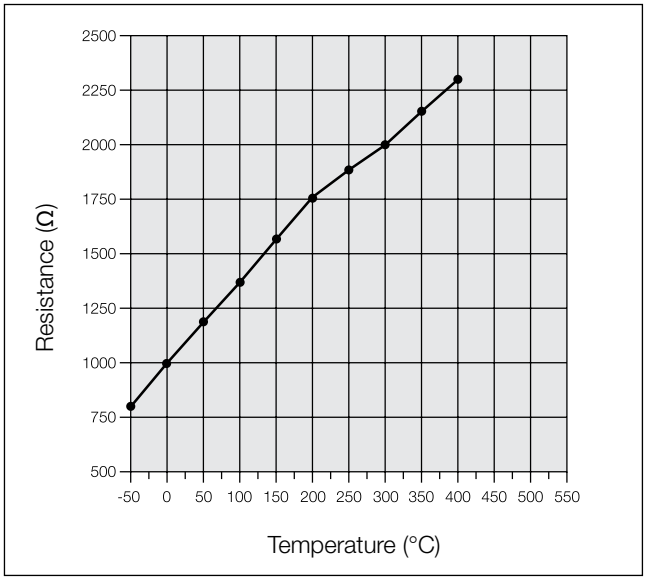


Diagram 2

Repair step 7

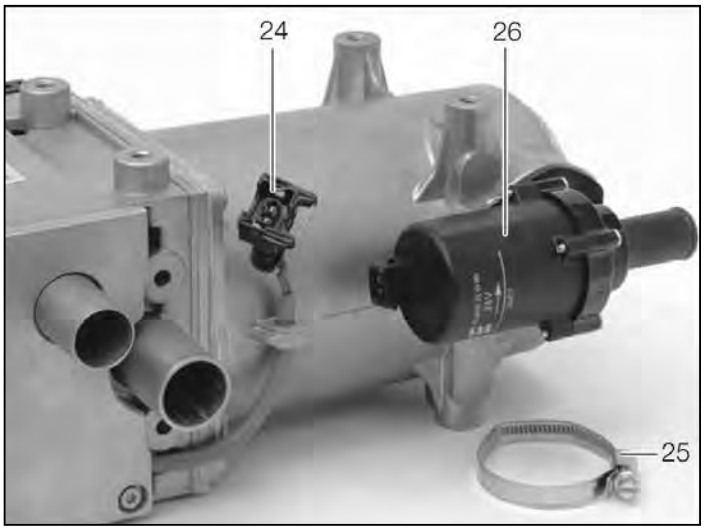
REMOVE / ATTACH WATER PUMP

Figure 39

- Disconnect the connector (24) at the water pump (26).
- Undo the hose clip (25)
- Remove the water pump.
- Check O-ring (See page 83 parts diagram #13), replace O-rings and lube with synthetic lube if necessary
- Install in the reverse order.

PLEASE NOTE!

When assembling the O-ring coat it with synthetic lube.



24 Water pump connector
25 Hose clip
26 Water pump

Figure 39

MEASURING THE FUEL QUANTITY

PREPARING FOR THE MEASUREMENT
(Sketch 4)

- Disconnect the fuel pressure line at the heater and place the end in a measuring cylinder (10 ml).
- Switch on the heater, if the fuel discharges uniformly and free of bubbles, the fuel pipe is filled and vented.
- Switch off heater and empty measuring cylinder.

MEASUREMENT

- Switch on heater and wait until the metering pump starts pumping the fuel.
- During the measurement, hold the measuring cylinder at the level of the heater.
  After 68 sec. the pumping of the fuel is automatically switched off.
- Switch off heater, as otherwise it will start up again.
- Read off the quantity of fuel in the measuring cylinder.

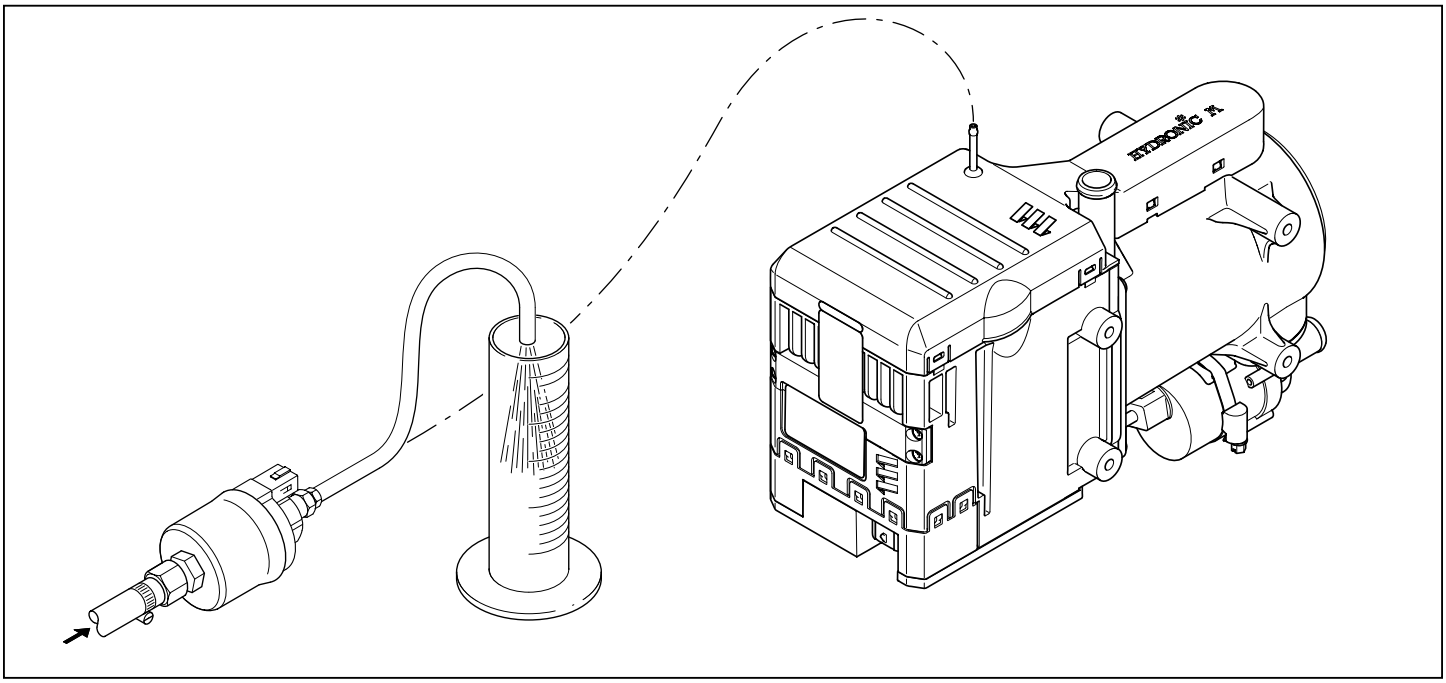
EVALUATION

Compare the measured quantity of fuel with the values in the following table.
If the measured quantity of fuel is above the maximum value or below the minimum value, the metering pump must be replaced.

HEATER	QUANTITY OF FUEL		
	DESIRED	MAXIMUM	MINIMUM
HYDRONIC M8 Diesel / FAME	5.7 cm^3 / 68 sec	6.27 cm^3 / 68 sec	5.13 cm^3 / 68 sec
HYDRONIC M10 Diesel	7.5 cm^3 / 68 sec	8.25 cm^3 / 68 sec	6.75 cm^3 / 68 sec
HYDRONIC M12 Diesel	7.5 cm^3 / 68 sec	8.25 cm^3 / 68 sec	6.75 cm^3 / 68 sec

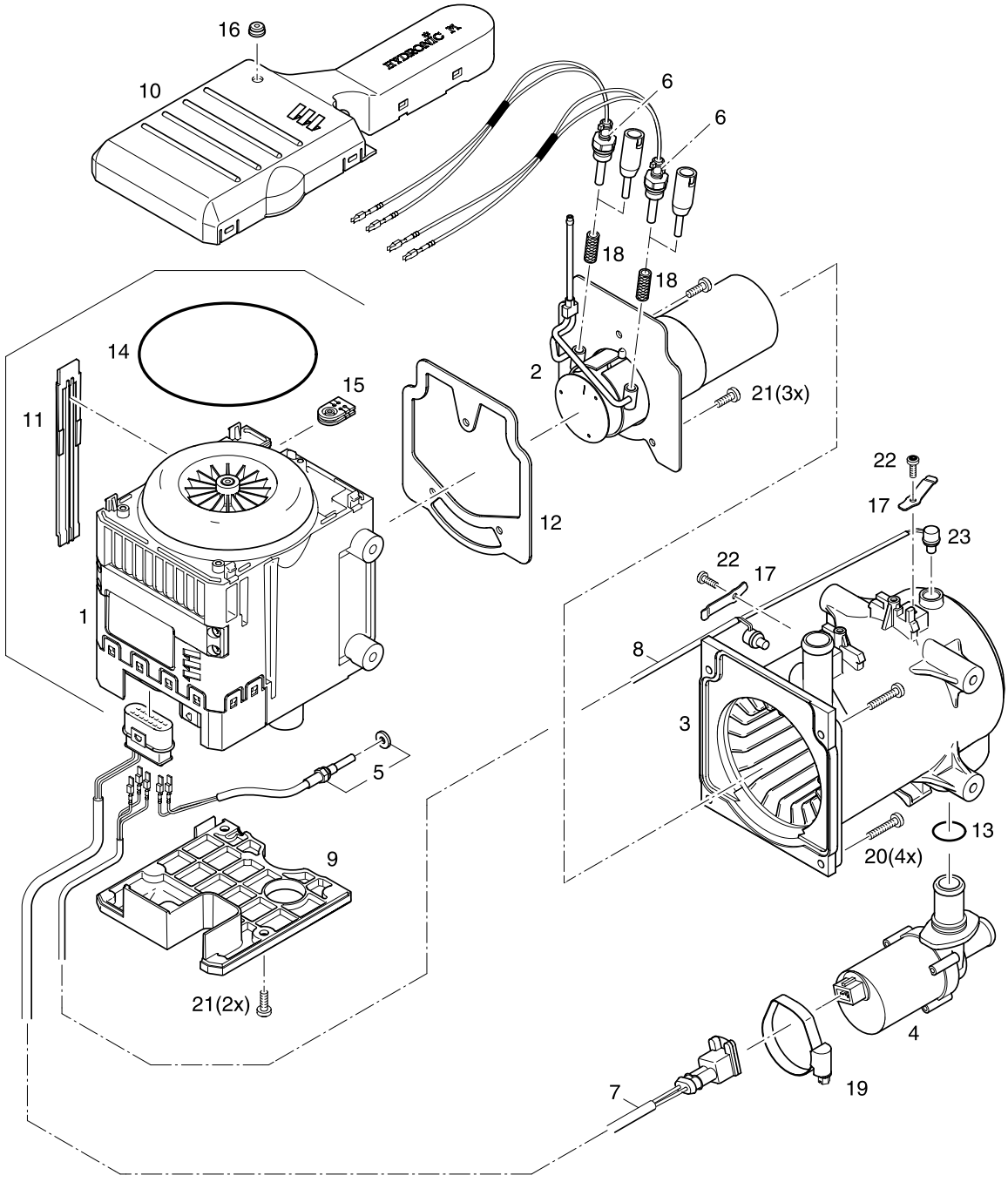
PLEASE NOTE!

Only carry out the fuel measurement if the battery is sufficiently charged. During the measurement the voltage applied to the box should be 12V or 24V.



Sketch 4

HYDRONIC M-II PARTS DIAGRAM



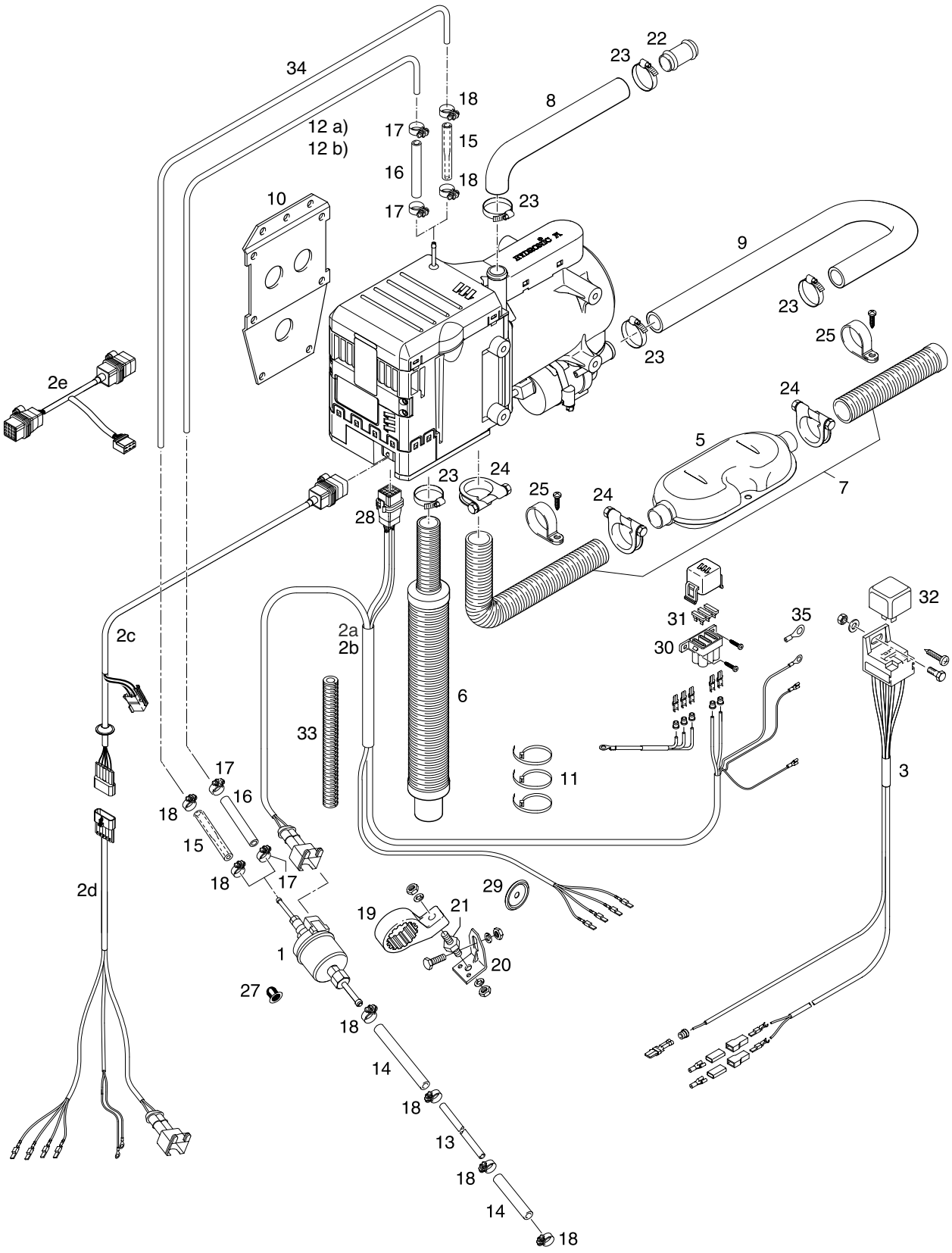
8 Heater Components - Parts

HYDRONIC M-II - 12 & 24 VOLT

DESCRIPTION & PART #'S

Ref. No.	Description			Part Number	Model #	25 2470 05 12v	25 2471 05 24v	25 2434 05 12v	25 2435 05 24v	25 2472 05 12v	25 2473 05 24v	25 2596 05 12v	25 2725 05 24v
1	Combustion air blower/ECU	24 V		25 2473 99 15 00		•							
		24 V		25 2471 99 15 00			•						
		12 V		25 2434 99 15 00				•					
		24 V		25 2435 99 15 00					•				
		12 V		25 2472 99 15 00						•			
		24 V		25 2473 99 15 00							•		•
2	Burner assembly			25 2435 99 11 00		•	•	•	•	•	•	•	•
3	Casing			25 2435 99 01 02		•	•	•	•	•	•		
4	Water pump	12 V		25 2434 99 25 01		•		•		•			
		24 V		25 2435 99 25 01			•		•		•		
		12 V		25 2434 99 27 01		•		•		•			
		24 V		25 2435 99 27 01			•		•		•		
	Albany Pump	(2280 L/hr) 12 V		20 2900 60 01 39		•		•		•			
		(2280 L/hr) 24 V		20 2900 70 01 40			•		•		•		
	E-Guardian Coolant Pump	12 V		25 2596 25 01 00								•	
5	Flame sensor			25 1920 37 01 00		•	•	•	•	•	•	•	•
6	glow pin	12 V		25 2434 01 01 00		•		•		•			
		24 V		25 2435 01 01 00			•		•		•		
7	Water pump harness			25 2435 25 02 00		•	•	•	•	•	•	•	•
8	Temperature overheat sensor			25 2435 40 03 00		•	•	•	•	•	•	•	•
9	Bottom cover blower housing			25 2435 01 00 02		•	•	•	•	•	•	•	•
10	Cover - Top			25 2435 99 01 03		•	•	•	•	•	•	•	•
11	Cover - Blower housing channel			25 2435 01 00 04		•	•	•	•	•	•	•	•
12	Seal for combustion chamber			25 2435 01 00 10		•	•	•	•	•	•	•	•
13	Water pump O-Ring	19,8 x 2,3		22 1000 70 00 17		•	•	•	•	•	•	•	•
14	Blower O-Ring	117,07 x 3,53		22 1000 70 00 15		•	•	•	•	•	•	•	•
15	Fuel pipe grommet			25 2435 01 01 04		•	•	•	•	•	•	•	•
16	Fuel pipe sleeve			20 1752 01 00 02		•	•	•	•	•	•	•	•
17	Spring clip			25 2281 01 00 09		•	•	•	•	•	•	•	•
18	Screen for glow pin			25 2069 10 01 02		•	•	•	•	•	•	•	•
19	Hose clip	33 – 57		5550001		•	•	•	•	•	•	•	•
20	Taptite screw	M 5 x 25	DIN 7500 TORX	109 10 152		•	•	•	•	•	•	•	•
21	Taptite screw	M 5 x 16	DIN 7500 TORX	109 10 151		•	•	•	•	•	•	•	•
22	Taptite screw	M 4 x 12	DIN 7985 TORX	5590010		•	•	•	•	•	•	•	•
23	O-Ring	7 x 2		25 2481 99 01 07		•	•	•	•	•	•	•	•

HYDRONIC M-II PARTS DIAGRAM



8 Heater Components - Parts

HYDRONIC M-II - 12 & 24 VOLT

PARTS LIST

Ref. No.	Description		Part Number	Model #	25 2470 05 12V	25 2471 05 24V	25 2434 05 12V	25 2435 05 24V	25 2472 05 12V	25 2473 05 24V	25 2725 05 24V	25 2596 05 12V
1	Fuel metering pump	12 V	22 4617 01 00 00		•		•		•			•
		24 V	22 4618 01 00 00			•		•		•	•	
2a	Cable harness - (JE Harness)	ADR	25 2435 80 07 00		•	•	•	•	•	•	•	•
2b	Cable harness - Universal		25 2800 70 10 12		•	•	•	•	•	•	•	•
2c	Boxed Adapter harness		25 2800 70 10 03		•	•	•	•	•	•	•	•
2d	Main box harness		25 2800 70 00 02		•	•	•	•	•	•	•	•
2e	Diagnostic adapter		25 2800 70 10 04		•	•	•	•	•	•	•	•
3	Relay harness		22 1000 33 04 00		•	•	•	•	•	•	•	•
4	FMP harness		22 1000 33 08 00		•	•	•	•	•	•	•	•
5	Exhaust muffler		25 1806 80 01 00		•	•	•	•	•	•	•	•
6	Intake silencer		25 1786 80 02 00		•	•	•	•	•	•	•	•
7	Flex exhaust w/cap		25 1816 80 08 00		•	•	•	•	•	•	•	•
8	20mm 90° bend coolant hose		20 1673 80 00 01		•	•	•	•	•	•	•	•
9	20mm 180° bend coolant hose		20 1673 80 00 03		•	•	•	•	•	•	•	•
10	Heater bracket		25 1816 80 00 01		•	•	•	•	•	•	•	•
11	Cable tie 12”		5590147		•	•	•	•	•	•	•	•
12 a	1.5 mm Plastic fuel line		890 31 118		•	•	•	•	•	•	•	•
12 b	20 mm Plastic fuel line		890 31 055		•	•	•	•	•	•	•	•
13	5.0 mm Fuel hose (biodiesel compatible)		360 75 401		•	•	•	•	•	•	•	•
14	Fuel hose 5x3mm		360 75 350		•	•	•	•	•	•	•	•
15	Fuel line adaptor 3.5 - 5mm		25 1888 80 01 02		•	•						
16	Fuel hose 3,5 x 3		360 75 300		•	•	•	•	•	•	•	•
17	9mm clamp		2068 00 90 98		•	•	•	•	•	•	•	•
18	11mm clamp		2068 01 10 98		•	•	•	•	•	•	•	•
19	FMP Holder		1000 50 07 00		•	•	•	•	•	•	•	•
20	FMP angle bracket		20 1348 03 00 04		•	•	•	•	•	•	•	•
21	Rubber mounting bolt		20 1185 00 00 01		•	•	•	•	•	•	•	•

HYDRONIC M-II - 12 & 24 VOLT

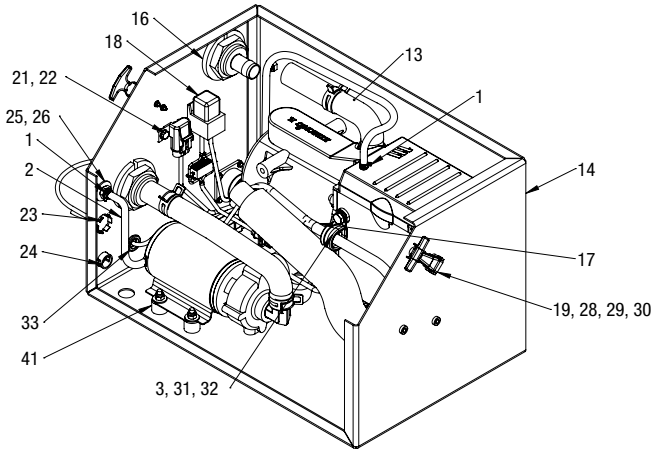
PARTS LIST, Continuation...

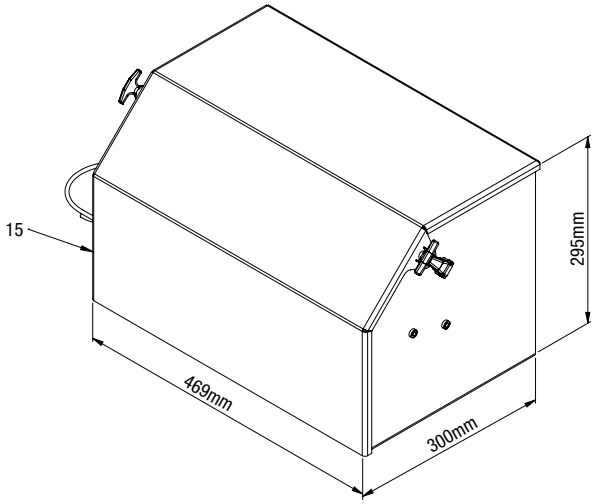
Ref. No.	Description		Part Number	Model # 25 2470 05 12V	25 2471 05 24V	25 2434 05 12V	25 2435 05 24V	25 2472 05 12V	25 2473 05 24V	25 2725 05 24V	25 2596 05 12V
22	Hose connector 20mm		20 1534 88 00 01	•	•	•	•	•	•	•	•
23	Clamp 20 - 32mm		10 2066 02 00 32	•	•	•	•	•	•	•	•
24	Flex exhaust clamp		22 1000 51 45 00	•	•	•	•	•	•	•	•
25	Clamp “C” type		152 09 010	•	•	•	•	•	•	•	•
27	Integrated fuel filter		20 1312 00 00 06	•	•	•	•	•	•	•	•
28	Socket housing		22 1000 31 93 00	•	•	•	•				
29	Grommet		20 1280 09 01 03	•	•	•	•	•	•	•	•
30	Fuse holder, receptacle housing kit		22 1000 31 06 00	•	•	•	•	•	•	•	•
31	Fuse	25 A	204 00 089	•	•	•	•	•	•	•	•
		15 A	204 00 003	•	•	•	•	•	•	•	•
		5 A	204 00 079	•	•	•	•	•	•	•	•
32	Relay	12 V	203 00 097	•	•	•	•				
		24 V	209 00 097	•	•	•	•				
33	Convoluted tubing	1/2”	20 2900 70 90 08	•	•	•	•	•	•	•	•
		3/8”	20 2900 70 90 13	•	•	•	•	•	•	•	•
		1”	20 2900 70 90 14	•	•	•	•	•	•	•	•
34	4mm Plastic fuel line (Biodiesel)		890 31 101	•	•	•					
35	Ring Terminal 5/16”		5670196	•	•	•	•	•	•	•	•
INSTALLATION KITS											
	Eberspaecher Universal Install	12V with diagnostic connection	25 2800 90 10 12	•		•		•			•
	Eberspaecher Universal Install	24V with diagnostic connection	25 2800 90 10 24		•		•		•	•	
	Boxed M12	Boxed D12 E-Guardian II ASMBLY 12V	25 2824 72 12 02								•
	Boxed M-II 12 KW Heater	Boxed D12 E-Guardian ASMBLY 12V - NY 2	25 2824 72 12 06								•
BOXED KIT											
	HYDRONIC M12 12 volt Boxed Kit		25 2824 72 12 10								•
	HYDRONIC M12 24 volt Boxed Kit		25 2824 73 12 10						•		
	HYDRONIC M12 12 volt Boxed Kit w/high Capacity Pump		25 2824 72 00 12								•
	HYDRONIC M12 24 volt Boxed Kit w/high Capacity Pump		25 2824 73 00 24						•		
	HYDRONIC M12 12 volt AfterMarket Kit		25 2825 96 12 00								•

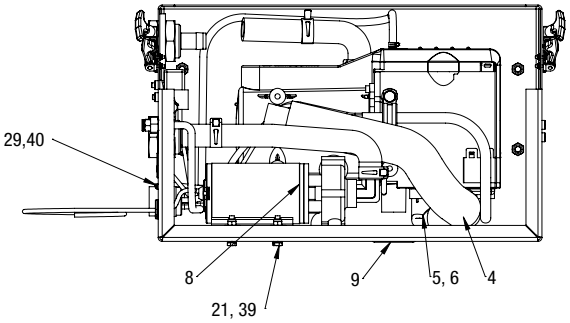
8 Heater Components - Parts

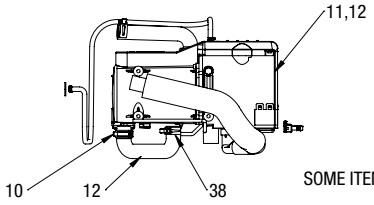
HYDRONIC M-II PARTS DIAGRAM

25 2824 72 12 02
25 2824 72 12 06
25 2824 72 12 10
25 2824 72 00 12
25 2824 73 12 10
25 2824 73 00 24

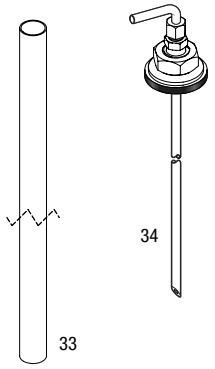


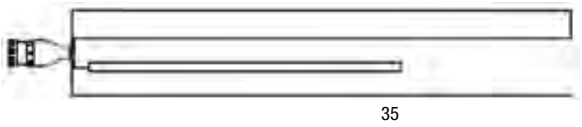


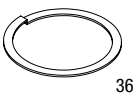


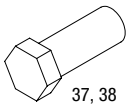


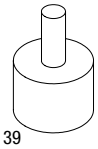
SOME ITEMS HIDDEN FOR CLARITY

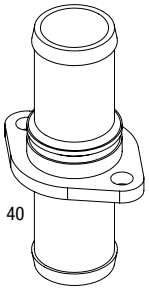


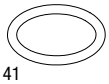


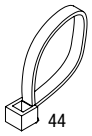


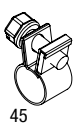


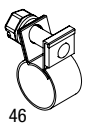


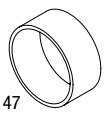


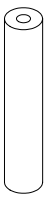


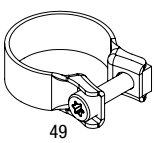


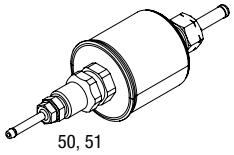


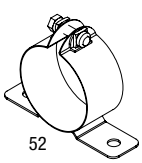


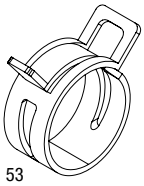












HYDRONIC M-II - BOXED KIT

PARTS LIST

Ref. No.	Description		Part Number
1	10.5mm Spring Clamp		5520034
2	Hose Fuel - 3.5 x 3 mm		360 75 300
3	Clamp. C Clip PVC Coat 5/8 inch		5520053
4	Air Intake Muffler w/end Cap		25 1786 80 02 00
5	Air Intake Elbow 25 mm		22 1000 40 00 01
6	Clamp 20-32 mm		10 2066 02 00 32
7	Cable Ties 12 inch		5590147
8	Basic Pump 24V Albany		20 2900 70 01 24
9	Silicon Seal - Exhaust		25 1216 88 03 01
10	29mm Spring Clamp		5530021
11	Heater M-II D12W	12V	25 2472 05 00 00
12	Heater M-II D12W	24V	25 2473 05 00 00
13	Coolant hose 20mm (180° bend) Short		24 0117 80 00 01
14	M-II with Albany Base		25 2800 40 10 25
15	M-II with Albany Lid		25 2800 40 10 26
16	1" FNPT Coolant Bulkhead Fitting		20 2900 20 10 10
17	M-II Harness with Albany	12/24	25 2800 70 10 25
18	Resistor 25W 80 OHM		5670441
19	Southco Latches		5520059
20	Bolt M6X12 DIN 933-8.8 PL		5590008
21	Washer 6mm Spring		5590084
22	Mounting Plate 1" Black Plug DOP 1000		5530024
23	Mounting Plate 3/4" Black Plug DOP 750		5520052
24	1/2" (13mm) Standard Flat Washer		5590139
25	Bulk Head Fuel Fitting Straight		25 2734 20 00 01
26	Washer Lock 3mm		5590089
27	M3 wave washer DIN137		5590117
28	Nut 3mm		5590069
29	M3 X 12 Bolt		5590183
30	Washer 8mm Spring D137B		5590085
31	Bolt M8 X 16		5590037
32	Grommet D2/D4 Airtronic		25 1371 15 00 14
33	Flex Exh 1 Layer 30mm/m		360 61 580
34	Fuel Pick up pipe 4mm with 1/2" NPT		20 2900 20 20 50
35	L-II Boxed Outside Harn Hyd 16-35		25 2800 70 10 14
36	Washer Lock M6 SS		5590077
37	Hex Head M3X10 8.8 ZPL		5590201
38	Bolt Hex Head M6X8 8.8 ZN PL		5590200
39	Shock Mount w/one 15mm Stud		5540031
40	Nozzle 20mm Water		22 1000 10 01 01
41	O-Ring 19.8 X 2.3 Waterpump M-II		22 1000 70 00 17
42	Screw-M 5x12 DIN 7985 OFL ZN		109 10 153

HYDRONIC M-II - BOXED KIT

PARTS LIST Continuation...

Ref. No.	Description	Part Number
43	Clamp 028 33mm-57mm	5550001
44	Cable Ties 197mm	5590003
45	Clamp 9mm	10 2068 00 9098
46	Clamp 11mm	10 2068 01 1098
47	Rubber Ring for Large FMP	20 1449 00 1001
48	Fuel Hose 3.5mm x 50mm	20 2900 20 0007
49	Exhaust Clamp 31-34mm	22 1000 51 4500
50	Fuel Metering Pump M-II Series - 12V	22 4617 01 0000
51	Fuel Metering Pump M-II Series - 24VV	22 4618 01 0000
52	Fuel Pump Holder	25 1156 20 0011
53	27mm Spring Clamp	5530010

CERTIFICATION

The high quality of Eberspächer's products is the key to our success.
To guarantee this quality, we have organised all work processes in the company along the lines of quality management (QM).
Even so, we still pursue a large number of activities for continuous improvement of product quality in order to keep pace with the similarly constantly growing requirements made by our customers.
All the steps necessary for quality assurance are stipulated in international standards.
This quality is to be considered in a total sense.
It affects products, procedures and customer/supplier relationships.
Officially approved public experts assess the system and the corresponding certification company awards a certificate.

Eberspächer has already qualified for the following standards:

Quality management as per
DIN EN ISO 9001:2000 and ISO/TS 16949:1999

Environment management system as per
DIN EN ISO 14001:1996

DISPOSAL

DISPOSAL OF MATERIALS
Old devices, defect components and packaging material can all be separated and sorted into pure-grade factions so that all parts can be disposed of as required in an environment-friendly manner or recycled where applicable.
Electric motors, controllers and sensors (e.g. temperature sensors) are deemed to be "electronic scrap".

DISMANTLING THE HEATER
The heater is dismantled according to the repair stages in the current troubleshooting / repair instructions.

PACKAGING
The packaging of the heater can be kept in case it has to be sent back.

EU DECLARATION OF CONFORMITY

The manufacturer:
J. Eberspächer GmbH & Co. KG

Address:
Eberspächerstraße 24
D-73730 Esslingen

herewith declares that the following product:

Product name:	**Vehicle heater**
Type	**Hydronic M-II**
Version	**D 8 W / D 10 W / D 12 W**

fulfils the requirements of the following EC Directives:

a) Heating systems directive 2001/56/EC,
Revision status 2006/119/EC
b) Radio interference (EMC) of vehicles 72/245/EEC,
Revision status 2006/96/EC
c) Heater control ECE-R 122,
Revision status 00
d) EMC of vehicles ECE-R 10,
Revision status 03

The following EC Directives and UN regulations have been used to assess the product: 2001/56/EC; 72/245/EEC; ECE-R 10; ECE-R 122

CONTACT US FOR TECHNICAL SUPPORT :

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Eberspächer

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